ember 1948

Chemical Industries

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MAGNESIA PULPING CUTS POLLUTION, PERMITS CHEMICAL RECOVERY — p. 938

Cover: Magnesia Recovery Unit

...*"so we kept trying Mathieson!"*

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Chemical Industries

"SERVING THE CHEMICAL PROCESS INDUSTRIES"

VOLUME 63 — NUMBER 6 DECEMBER, 1948

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Low-Temperature Spectroscopy
Methanol Refines Sugar
Citric Improves Soya Oil
Urea-Formaldehyde Aids Laminates
Pelleted Seeds
FDA Bans Nitrogen Trichloride
Magnesium Bisulfite Pulping
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Professional Union at Shell
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Cattle Eat Urea

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Chemical Industries is indexed regularly by Engineering Index, Inc. and Industrial Arts Index.

Cover: Babcock & Wilcox Co.

Price of this issue: Part 1, 60¢; Part 2, $2.50

PUBLICATION STAFF: Editor, Robert L. Taylor; Managing Editor, Howard C. E. Johnson; Associate Editor, Herman W. Zabel; Assistant Editor, John J. Craig; Editorial Assistant, Barbara M. Bissell; Contributing Editors, T. Pat Callahan, T. N. Sandifer; Production Manager, Olga E. Vaream. **CONSULTING EDITORS:** Robert T. Baldwin, Lawrence W. Bass, Benjamin T. Brooks, J. V. N. Dorr, Charles R. Downs, Ernest W. Reid, Norman A. Shepard. **BUSINESS STAFF:** Business Manager, W. Alec Jordan; New York, L. C. Todaro, Wm. B. Hannum, Jr., Richard F. Burkhart; Chicago, Frank C. Mahnke, Jr.; Los Angeles, Don Harway; Circulation Manager, Florence Sanders.

Published monthly at 1309 Noble St., Philadelphia 23, Pa., and entered as 2nd class matter July 15, 1944, at the Post Office at Philadelphia 4, Pa., under the Act of March 3, 1879. Subscription $5 a year, $8 for two years, $10 for 3 years. Add $2 per year for postage to Latin America. Other foreign rates, except Canada, $15 one year, $30 for 3 years. Single copies 60c, except special issues. Canadian subscriptions and remittances may be sent in Canadian funds to Chemical Industries, P. O. Box 100, Terminal A, Toronto, Canada. OFFICE OF PUBLICATION: 1309 Noble Street, Philadelphia 23, Pa. EDITORIAL & EXECUTIVE OFFICES: 522 Fifth Ave., New York 18. Murray Hill 2-7888. DISTRICT OFFICES: Chicago: 309 West Jackson Boulevard, Chicago 6, Ill., Harrison 7890. Los Angeles: 1709 W. 8th St., Los Angeles 14, Calif., Fa-8576. San Francisco: 57 Post St., San Francisco 4, Calif., Yukon 6-1069. London: Sun Life of Canada Bldg., Trafalgar Square, London, S. W. 1, England.

A MACLEAN-HUNTER publication, Horace T. Hunter, President

THE READER WRITES

Steroidal Hormone Patent Status Clarified

To the Editor of Chemical Industries:

I read with interest the reply of Dr. F. Jonas to the article of Dr. Howard C. E. Johnson in the June issue, in which Dr. Jonas attempts to clarify the patent situation in regard to the production of steroidal hormones from dioscoreas in Mexico.

All the patents I have obtained on these processes, which are based solely upon my research at the Pennsylvania State College, have been assigned to Parke, Davis & Company, and are covered completely in the United States, Canada, England and France. I have taken out no patents for Mexican production.

The process which I installed at Syntex, S. A., is identical in every respect with that covered by the patents assigned to Parke, Davis & Company in the United States. For the past three years I have not been affiliated in any manner with Syntex, S. A. The only company I am now connected with for the manufacture of steroidal hormones in Mexico is Hormosynth, S. A., an affiliate of Gedeon Richter, S. A. At the latter laboratories I have installed processes based upon more recent research, which are quite independent of the processes assigned to Parke, Davis & Company in the United States.

In addition to manufacture from diosgenin and yamogenin, Hormosynth, S. A., is using kryptogenin. The kryptogenin constitutes approximately one-third of the total steroidal sapogenin content of the dioscoreas and can be converted into the steroidal hormones in a much higher yield than either diosgenin or yamogenin. The kryptogenin isolated from the sterol mixture gives approximately the same quantity of hormones as is obtained from the total combined diosgenin and yamogenin. No patents have been applied for on this process.

RUSSELL E. MARKER
Mexico City

U. S. Makes Plenty of Hardwood Pulp, Too

To the Editor of Chemical Industries:

The CI Newsletter for September, 1948, states that "straight hardwood pulp is now being made only in France and Sweden."

Such statements destroy faith in your other news. Every day 150 tons or more of straight hardwood pulp pass within 20 feet of where I write. True, some days there are some pine fibres due to mixing a few sticks of wood at the shippers plant or by use of return water from the pine system.

This is not the only operation in the United States. Within a few blocks of your office, if you check, are the sales or executive offices of numerous pulp manufacturers who will admit they make straight hardwood pulp. They may not have it for immediate delivery, for those I know best are using their production to make paper, but still they make the pulp.

I enjoy CHEMICAL INDUSTRIES. From it I have learned much, so please preserve my confidence.

FRED DOUTT
The Champion Paper and Fibre Co.
Canton, North Carolina

CI regrets its error in confusing a specific process for hardwood pulp used in France and Sweden with the general operation of hardwood pulping.—ED.

A Useful Reference Tool

To the Editor of Chemical Industries:

We were interested to note the list of "New Chemicals for Industry" in the September issue of CHEMICAL INDUSTRIES. It is a very useful reference tool for libraries.

Will you please advise whether or not this section has been reprinted separately?

PATRICIA SNYDER, Research Librarian
Owens-Illinois Glass Co.
Toledo, Ohio

We regret to say that "New Chemicals for Industry" will not be available in reprint form. However, we still have a very limited number of September issues available at the regular single issue price of 60 cents.—ED.

Michigan Atlantic Corp. Not Part of Wyandotte

To the Editor of Chemical Industries:

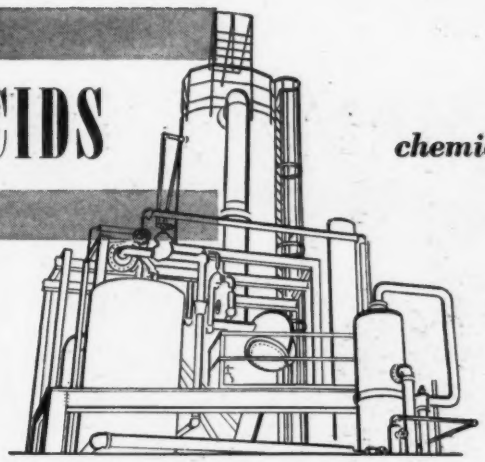
Your article "Chemicals Ride the Waves" in the October, 1948, issue is a very interesting story on transportation by water, but in one paragraph you refer to the Michigan Atlantic Corp. "as a subsidiary of Wyandotte Chemicals Corp."

The article is true in every respect, but we wish to advise that the Michigan Atlantic Corp. is not, and has not been, a subsidiary of the Wyandotte Chemicals Corp. since July, 1946. It is a wholly owned stock company, control of which is held by Mr. M. J. Cardillo, president.

L. M. CARDILLO, VICE PRESIDENT
Michigan Atlantic Corp.
New York, N. Y.

FATTY ACIDS

chemical data... product data... use data



fractional distillation

FOR EFFICIENT RAW MATERIAL UTILIZATION

Armour's patented fractional distillation process is not only the source of new products and the key to improved products, but is also the answer to more efficient and more complete utilization of raw materials. This process for the separation of crude mixed fatty acids into their pure component acids now enables industry to make use of raw materials or even waste products which previously had little or no commercial value. An excellent example is found in the case of tall oil.

Crude tall oil is a by-product of the sulphate paper industry. A mixture of rosin acids, fatty acids, color bodies, odoriferous material and unsaponifiable matter, tall oil is dark in color and has a most disagreeable odor. As a result, it has had extremely limited usage in the past, restricted chiefly to very low grade soaps and industrial coatings.

Chemists in both the United States and Europe spent many years in attempting to develop a method for processing crude tall oil into a more usable material, since huge quantities are produced annually. This work was not too successful—although straight distillation improved color and odor somewhat.

But in 1942 Armour chemists and chemical engineers began the fractional distillation of this lowest of low grade raw materials—and produced new fatty acid mixtures having valuable properties. In the face of the wartime shortage of more conventional fats and oils, this added immeasurably to the total stock of fatty materials available to industry.

Armour separates tall oil into three basic fractions, as follows:

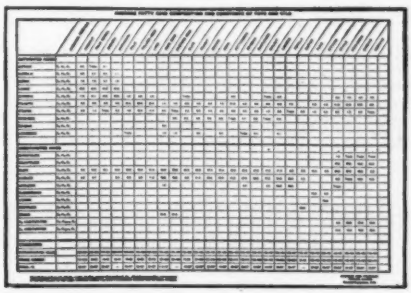
(1) the fatty acid fraction, which contains an average of 88% oleic-linoleic acids and 12% rosin acids, is sold commercially as Neo-Fat S-142. This product is light in color, mild in odor, low in unsaponifiable content, excellent for jell and liquid soaps, alkyd resins, ore flotation, etc.

Neo-Fat S-142 is also re-distilled to become Neo-Fat D-142, with an even lighter color and lower rosin acids content (6% as compared with 94% oleic-linoleic acids). Neo-Fat D-142 is especially adapted to the manufacture of alkyd resins which are non-yellowing, have superior water and alkali resistance, and excellent adhesion to metal. It is also used for special polishes, shampoos, etc.

(2) the rosin acid fraction, which is a mixture of about 70% rosin acids and 30% fatty acids (oleic-linoleic). As Neo-Fat D-242, this product has been of great interest wherever rosin has previously been used. (Neo-Fat D-242 is now specially processed for ease of handling and can be poured from a drum—unlike rosin which requires costly and inconvenient chopping, picking and shoveling). Neo-Fat D-242 is used in protective coatings, soaps, rubber reclaiming, core oils, paper sizes, linoleum, greases.

(3) the residue fraction, which is processed into Neo-Fat D-342—a tall oil pitch which is comparatively light in color with a mild odor and a smooth, glossy appearance. Since it has definite drying properties, Neo-Fat D-342 has found wide usage in paints, asphalt tile, linoleum, wire covering, etc.

Up to this time, no other process has produced from tall oil products having comparable uniformity, quality and breadth of usage.



Handy Reference Chart. This "Fat and Oil Composition and Constants Chart" is available upon request. This helpful chart shows the average fatty acid composition and constants of 26 widely-used fats and oils.

FATTY ACIDS FOR BUFFING COMPOUNDS

Buffing compounds are used for cleaning and polishing metal surfaces, either before or after plating or before painting, lacquering or enameling. Since it is important that no residual trace of buffing compound be left on the polished surface, ease of cleaning is an essential factor. A high percentage of saponifiable material is preferred in formulating buffing compositions because alkaline cleaning baths are commonly used.

Buffing compounds are composed of binding agents together with abrasive and polishing agents such as tripoli, silica flour, carborundum powder, etc. Armour's Neo-Fats H.F.O., 1-60, 1-54, 1-65 are recommended for use as the binding agent, since these fatty acids increase lubrication and adhesion to the polishing wheel.

A REMINDER FOR ALKYD RESIN MANUFACTURERS

Now that it is again possible to choose from several available fatty acids for alkyd resins, it is particularly important that you should use the specific fatty acid best suited to your product. That's why you should investigate Armour's Neo-Fats S-142, D-142, 3-R, and 11—all developed especially for the alkyd resin industry.

USE OF FATTY ACIDS IN INSECTICIDES, FUNGICIDES AND DISINFECTANTS

Fatty acids are widely used in preparing spray emulsions for insecticides, fungicides, and disinfectants. A soluble oil base is prepared in which the active ingredients of the finished spray are dispersed. Before application, this base is diluted with water.

The emulsifying action in these oil solutions is brought about by the presence of soaps, sulphonated oils, petroleum sulphonates, etc. Generally these soaps are formed "in situ" by the saponification of vegetable fatty acids, fish fatty acids, oleic acid, etc. with the desired alkali.

Whenever practical, use of emulsions for insecticides, disinfectants, etc., is the most economical and most satisfactory method to employ, since any desired dilution with water may be obtained. Especially for these emulsions the Armour Chemical Division recommends Neo-Fat 3, 3-R, S-142, and D.D. corn, cottonseed, coconut and soybean fatty acids. Armour also offers a group of fatty acid derivatives, the ARQUADS. These alkyl trimethyl ammonium chloride compounds are valuable as the toxic agent in these same insecticides and related products.

Free Informative Booklet. Write for the concise, detailed booklet "The Selection and Use of Fatty Acids" which indicates how many products can be improved through the use of fatty acids and their derivatives.

Mail this coupon today

(Attach to your business letterhead, please)

Please send me, without charge, items checked below.

- ☐ Composition and Constants Chart
- ☐ Booklet, "The Selection and Use of Fatty Acids"
- ☐ Individual Data Sheets on_____

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ARMOUR *Chemical* DIVISION

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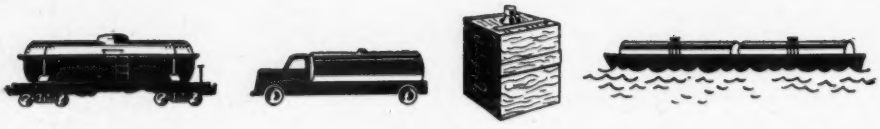
Plant and Laboratories of the Cornwell Chemical Corporation on the Delaware River, Cornwells Heights (just outside of Philadelphia). Key location is hub of Cornwell's water-route and rail distribution system.

service



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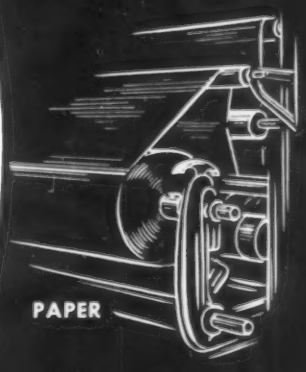
- **Extremely fast wetting action**
- **Excellent properties of dispersion and emulsification**


TEXTILES


SHAMPOOS


INDUSTRIAL CLEANING


AGRICULTURE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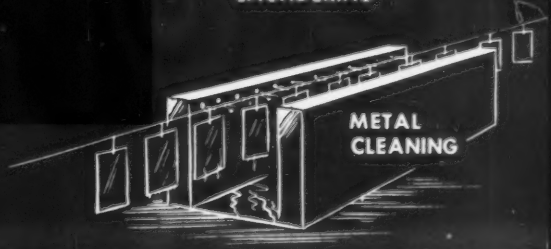
LAUNDERING


METAL CLEANING

More about NYON...

NYON 218 is a clear, straw colored liquid surface active agent of the non-ionic type. It is supplied in highly concentrated form and contains no alkali.

The performance of NYON 218 is scarcely affected by the degree of water hardness. While most synthetics are effective within narrow limits, NYON 218 is efficient over wide variations in pH and temperature. It can be compounded with soap and with synthetic anionic or cationic surface active agents to improve materially many of their properties.

The action of NYON 218 is so powerful that there are few instances where it need ever be used in concentration exceeding 0.05%. Not only does the detergent action of NYON 218 rank with the very best of the synthetics, it is also a faster wetting agent than most compounds recommended specifically for that purpose.

It is unusual for a *single* product to demonstrate all these surface active properties to such a high degree of efficiency. For this reason NYON 218 excels in a widely diversified range of applications.

NYON 218 is readily available in drums and tank cars. We will be glad to send samples and information at your request.

SHARPLES CHEMICALS INC.

123 S. BROAD STREET • PHILADELPHIA 9, PA.

SHARPLES TRADE MARK CHEMICALS

You Have a Choice of 3 Sizes in Hooker Aluminum Chloride

In many reactions catalyst effectiveness is directly related to size of catalyst. Hooker therefore makes its Aluminum Chloride available in three sizes:

Fine Grind ..... an unscreened material practically all passing 20 mesh.

Coarse Grind .... unscreened, 1 mesh and finer containing 25 to 35% finer than 20 mesh.

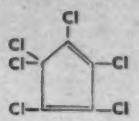
Coarse Screened. . same as above screened to remove 20 mesh and finer.

These three sizes have proved to be those most in demand and from them you can select the one that will give you the best results.

HOOKER RESEARCH PRESENTS

HOOKER C-56

(Hexachlorocyclopentadiene)



Molecular Weight	272.79
Freezing Point	−2° C
Boiling Point	236° C
Distillation Range (ASTM)	236 to 245° C
Refractive Index n20/D	1.564
Specific Gravity 15.5°/15.5° C	1.715

Indications are that C-56 (hexachlorocyclopentadiene), a new product of Hooker Research, can be a valuable new organic compound. As a highly reactive intermediate it enters readily into many different types of reactions. Some of the end products are acids, acid chlorides, acid anhydrides, esters, amides, ketones, diketones, quinones, acetals, nitriles and fluorocarbons. The probable fields for the applications of this new chemical are insecticides, dyes, pharmaceuticals, resins, germicides, and fungicides. Hooker C-56 is a yellow to amber colored liquid with a pungent odor.

Technical Data Sheet No. 371 describes Hooker C-56 more completely, gives physical and chemical data, and indicates typical reactions. Copies are available when requested on your company letterhead.

Once you've determined the size you require, you can be sure of smooth reactions, unaffected by catalyst impurities, or analysis changes from shipment to shipment. Hooker Aluminum Chloride, Anhydrous, is always the same—particularly free from iron and other non-sublimables—and every shipment held to the same rigid specifications.

To be sure of uninterrupted reactions in Friedel-Crafts syntheses, polymerization, isomerization and halogenation, select Hooker Aluminum Chloride, Anhydrous.

Additional physical and chemical data on this important chemical are contained in Technical Data Sheet 714, sent when requested on your letterhead. Hooker's Technical staff is also available for consultation and help on the application of Aluminum Chloride and other Hooker chemicals to your purposes.

SPECIFICATIONS

Hooker Aluminum Chloride, Anhydrous	$AlCl_3$
Gray crystalline solid in three sizes.	
Molecular Weight	133.3
ANALYSIS	
Aluminum Chloride	98.5% min.
Iron	0.05% max.
Non-sublimables in air at 950° C	1.5% max.

From the Salt of the Earth

HOOKER ELECTROCHEMICAL COMPANY

3 UNION ST., NIAGARA FALLS, N. Y.

NEW YORK, N. Y. • WILMINGTON, CALIF. • TACOMA, WASH.

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U.S.I. CHEMICAL NEWS

December ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1948

Important Esters to Come from American Hydrocarbon Synthesis

Compounds Are Useful As Solvents And Raw Materials in Syntheses

Aliphatic esters, an important class of compounds used widely in industry as raw materials and as solvents will soon be made more available, through the American Hydrocarbon Synthesis. These esters have many uses in the process industries, in lacquer manufacturing, and in the production of cosmetics, food flavorings, perfumes and pharmaceuticals.

From the four organic acids and the large number of alcohols to come from the water soluble stream of the synthesis, a great variety of esters can be produced. This increase in the number and variety of esters available will widen the range of physical and chemical properties obtainable from this class of compounds, and will make them a more versatile group both as raw materials and as solvents.

New Materials

Some of the esters which are to be produced — ethyl acetate and butyl acetate, for example — are already well known to users of commercial chemicals. In addition to these familiar compounds, a number of new esters never before produced on a commercial scale will be offered.

Spraying of fenders with lacquer. Esters to be made available by the American Hydrocarbon Synthesis are important lacquer solvents, and will help manufacturers to produce better coatings.

Esters like normal propyl acetate, normal propyl pro-

MORE

Gives Ornamental Effects To Surface of Plastics

A continuous process for imparting an ornamental surface finish to sheets of thermoplastic material is described in a patent published recently. An endless pressure band is looped around part of the circumference of a heated, rotating drum. Thermoplastic sheets are inserted between the drum and the pressure band. Under conditions of heat and pressure, thin flexible metal plates, having the desired surface pattern, are fed between the drum and the sheet.

Superior Quality Inks Are Now Possible With Three New Resins

New Pure Drying Long-Oil Phthalic Alkyds Are Useful For Litho Inks, Letterpress Work, and Varnishes

With the addition of three new 100% solids alkyds—Aroplaz 1271, Aroplaz 1273, and Aroplaz 1277—to its line of natural and synthetic resins, U. S. Industrial Chemicals, Inc., now offers printing ink makers a complete line of resins for use in almost every printing ink style, it was announced recently.

Processed For Specific Purposes

Years of continual research and testing have gone into the development of new and improved resins, company officials stated, to meet the exacting requirements of standard and new fast-printing processes. The new resins have been scientifically processed for specific purposes, and are said to have ideal properties for producing superior quality inks.

These three new resins are pure drying long-oil phthalic alkyds, designed to provide faster dry, better working qualities, greater scuff resistance than litho oils, and superior color retention. They are described as useful for lithographic bases and inks, for general let-

New resins developed by U.S.I. will be a valuable aid in producing improved inks and varnishes for high quality printing.

MORE

Want 'Tailor-Made' Snow? Here's How To Get It

Man not only can produce a laboratory snowstorm, but can now, to some extent, select the particular brand of snow he desires, according to a recent scientific report. For years variations in moisture and humidity in the sky have been regarded as the basic cause of the differences in types of snowfall. The recent experiments, however—involving the introduction of foreign vapors into a cold-chamber snowstorm — indicate another possible cause.

Crystal Structure Changed

In tests, small quantities of butyl alcohol vapor transformed a snowstorm of hexagonal plate crystals into one of hexagonal columns or prisms. When the chamber was cleared of the alcohol vapor, the snow crystals were caused to return to their original shape, the report reveals. The scientists stated that under ordinary conditions cold-chamber snowstorms usually form as hexagonal plates. By introducing a number of different vapors into the cold-chamber several freak forms, probably transitional, are said to have been produced.

The new discoveries have no particular practical application in dealing with natural snowstorms as yet, the scientists said, but represent progress in unravelling the mystery of what causes weather conditions as we know them.

Enthusiastic Reception For New Non-Hazing Alkyd

Aroplaz 1248-M, the first non-hazing architectural alkyd to be marketed as such, which was introduced in the October issue of U.S.I. Chemical News, has been enthusiastically received by the protective coatings industry.

Manufacturers of finishes are already using this unique resin as the foundation for their premium white and colored lines, and for the short time that has elapsed since its introduction, the production of Aroplaz 1248-M has reached a large volume, according to officials of U. S. Industrial Chemicals, Inc. In addition to its "non-hazing" quality, enamels based on Aroplaz 1248-M exhibit unusual repellency to dirt and staining.

Users of architectural finishes, as well as manufacturers, have also evidenced keen interest in this new alkyd, judging by the large number of inquiries received.

Seamless Plywood Tubing Can Now Be Produced

Seamless tubing can be made from molded wood, according to a patent published recently. A thermo-sensitive adhesive is applied to a number of double-ply veneers. Successively narrower strips of the veneers are introduced into a rigid cylindrical casing, through one end. An expansible membrane, placed inside the assembled veneers, is distended by a heated medium — at a pressure sufficient to press the veneers outward against the casing and mold them into a seamless tubing.

December ★ **U.S.I. CHEMICAL NEWS** ★ 1948

New Method of Estimating Urethan in Blood Is Found

A new method for estimating the amount of urethan in blood has been developed by a group of British researchers. The principle upon which the analysis is based is that urethan (ethyl carbamate) is hydrolyzed quantitatively into ammonia, carbon dioxide, and ethyl alcohol by boiling in the presence of sodium hydroxide.

Procedure For Making Analysis

According to the scientists, a Folin-Wu blood filtrate is refluxed with sodium hydroxide. The ethyl alcohol produced is then distilled into potassium dichromate, and the excess dichromate is titrated with sodium thiosulfate — after the addition of potassium iodide solution. Urethan content is said to be equivalent to the amount of potassium dichromate reacted with the alcohol. The blood should be as fresh as possible, the authors warn, and the patient should take no other drugs which may affect the results.

U. S. Industrial Chemicals, Inc., is now making U.S.P. urethan available in quantity to meet the demands of the pharmaceutical trade. Oral daily administration of 1-3 grams of the compound may maintain a relatively high blood level for a long time, the researchers stated.

CONTINUED New Resins For Printing

terpress work, and for mixing varnishes when quick drying and tough prints are desired.

Other U.S.I. Products for Printing

A number of other alkyds are available — offering a wide range of oil content, drying speed, hardness, and other properties — for use in roll coat and tin printing. Modified phenolic, standard maleic and standard natural resins are also being marketed by U.S.I. for use in rotogravure printing — as well as a wide variety of resins for use in heat-dry inks, aniline inks, and steam-set inks.

Other U.S.I. products for the printing trade include alcohols, solvents, nitrocellulose solutions, and special perfumes and essential oils for use in printing inks.

CONTINUED Important Esters

pionate, and normal butyl propionate will be of particular interest to lacquer manufacturers. Propyl acetate has properties intermediate between those of ethyl acetate and butyl acetate. Propyl propionate and butyl propionate are similar in properties to butyl acetate and amyl acetate, respectively. The normal-amyl acetate to be produced will be similar in properties to the fermentation amyl acetate currently in use, but is expected to have better solvent power for many materials because it is a normal ester. The new materials hold out the promise of many new possibilities not only to the protective coating industry, but to all industries which use esters.

Trained Minnows Detect Phenol-Polluted Water

University scientists are now using trained fish to detect industrial water pollution, according to a recent report. Phenolic wastes, dumped by many industrial establishments into natural waters, form chlorophenol compounds in water purification plants—and these compounds give the purified drinking water an unpleasant taste and odor.

The method of detection is said to depend upon the fact that bluntnose minnows react to water containing phenol more rapidly than any known chemical methods, at concentrations lower than those which can be tasted by humans. The minnows are trained, it is reported, to expect food whenever the odor of phenol is introduced into the aquarium. When the minnows smell traces of phenol, they rush to the place where they have been accustomed to find food, the scientists stated.

Paint Simulates Wallpaper

A paint that simulates wallpaper has been developed, according to a patent published recently. It is said to contain wax, turpentine, whitening, and white lead.

'Dry' Plating Process

A metal plating process utilizing a gaseous medium is said to have been developed for plating of strip moving at fairly high speeds.

TECHNICAL DEVELOPMENTS

Further information regarding the manufacturers of these items may be obtained by writing U.S.I.

To help solve the steel drum shortage for shippers of substances in open-head returnable-type drums, a new bag-type liner, said to be made-to-measure to fit any size drum, is on the market. **(No. 393)**

A new flameproof sponge rubber, said to be made in a simple on-the-spot apparatus that delivers the material for insulation, soundproofing, or cushioning, is tough, resilient, and substantially odorless, the makers state. **(No. 394)**

A highly accurate heat measuring instrument, reported to control roll surface temperatures of calenders, dryers, and similar roll type machines within 2°F. limits, is simple to install and maintain, the manufacturers assert. **(No. 395)**

For taking reflectance and gloss measurements, a new portable instrument, described as rugged and inexpensive, is now available. **(No. 396)**

For rapid measurement of solutions used for routine testing, as in biological assays and plant control testing, a new solution dispenser is available which is said to give accurate deliveries up to 100 ml. **(No. 397)**

A stainless steel powder, said to mix with a variety of vehicles such as clear lacquer, varnish, or bronzing fluid, is useful, it is claimed, wherever acid or salt conditions exist. Application is by brush or spray, the makers state. **(No. 398)**

A new durable traffic-marking paint, designed for industrial marking off of safety, storage, and traffic areas, is said to be non-slippery and resistant to continual cleaning. **(No. 399)**

A positive shut-off valve for corrosive fluids and highly penetrating liquids, designed to meet the needs of the petroleum, chemical, and related industries is said to be useful in lines handling mixtures of light hydrocarbons and hydrofluoric acid, sulfuric acid, and caustic soda. **(No. 400)**

A damp-proof, transparent, masonry coating, described as non-inflammable and non-toxic, will not peel or dust off, blister or bloom, it is claimed. An ordinary paint brush can be used for application, the makers state. **(No. 401)**

An X-ray gauge to control thickness of metal, glass, paper, and plastic sheets, is claimed to offer advantages of instantaneous response to changes, no contact with material, and ready access to areas never before gauged. **(No. 402)**

A new porcelain-like synthetic enamel, said to have abrasion resistance definitely superior to ordinary enamel, is particularly outstanding in its resistance to alkalis and acids, the manufacturers claim. **(No. 403)**

An Important, New Booklet . . .

Here are the facts about this new, 20-page booklet on the modern way to pump corrosives . . . the Model 40 Durcopump.

- It tells what Durco alloys the pump can be built in and gives a brief description of their physical characteristics.
- It shows and explains every feature and detail of the pump's construction.
- By means of cutaway and exploded views it lets you examine every part of the design.
- It explains the convertibility of the pump from one type of corrosive to another.
- It has a chapter on accessories and modifications.
- It tells about Durco's pump testing procedure.

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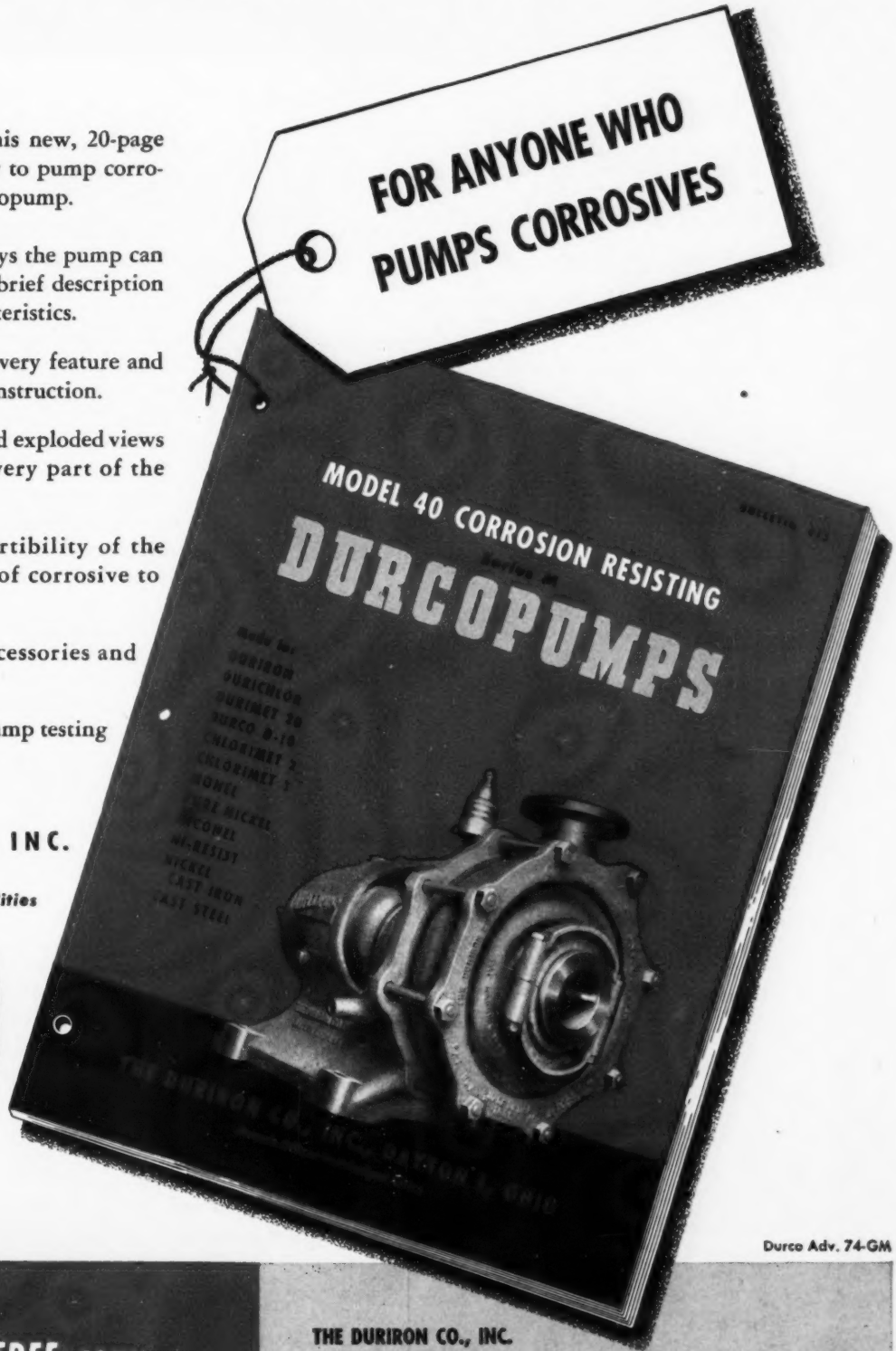

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The Santomerses fill industry's varied needs for surface-active agents and detergents

"Santomerse" has become a familiar word throughout industry... It represents Monsanto's complete series of alkyl aryl sulfonates, used more and more every day for countless jobs done quickly and economically with high-efficiency surface-active agents and detergents.

SANTOMERSE No. 1 is Monsanto's all-purpose detergent and wetting agent. It possesses in unique combination these valuable properties: wetting out, dispersing, emulsifying, penetrating, cleaning action. Furnished in flake or bead form.

SANTOMERSE No. 3 combines maximum detersive action and emulsifying power with wetting—because of the relatively higher molecular weight of the alkyl group. Furnished as dry powder, 100% active.

SANTOMERSE No. 3 **PASTE** consists of 75% Santomerse No. 3 and 25% water. Convenient to use where a surface-active material is to be added to an aqueous solution.

SANTOMERSE D is characterized by lower molecular weight of the alkyl group. Particularly effective where solubility, wetting, penetration and metallic ion stability are of primary importance. Furnished as powder, 100% active.

SANTOMERSE S is a 30% aqueous solution of Santomerse D. Recommended where a surface-active material in liquid form is preferred.

The Santomerses perform all of these important functions even under extreme conditions—they are remarkably resistant to decomposition by either strong acids or alkalis. If you would like more information on their many profitable uses, ask for copies of Monsanto Application Data Bulletin No. P-118 (on Santomerse No. 1) and Monsanto Technical Bulletin No. P-123 (on the other Santomerses). Write to Monsanto, Phosphate Division, or note your request on the coupon.

Santomerse: Reg. U. S. Pat. Off.

Santicizer 141 is the *safe* plasticizer to use where ordinary polyvinyl chloride films or coatings constitute dangerous fire hazards... Compounds plasticized with Santicizer 141 flame out in *1 second flat*, compared with much higher burning rates when other equally efficient plasticizers are used. In addition, Santicizer 141 provides higher standards of flexibility and toughness in heavy and light-gauge films used for a multitude of household and industrial products.

Santicizer 141 is *safe*, too, because of its very low toxicity, a quality which makes it suitable for vinyl hospital sheets, anatomical restorations, shoes, dentures, baby pants and other products which come into intimate contact with the human body.

Furthermore, it is *safe* to rely on Santicizer 141 for your 1949 production schedules—commercial quantities are now available. Full information is contained in a new illustrated booklet, "Santicizer 141... the SAFE Plasticizer." For your copy, ask any District Sales Office or write MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1703 South Second Street, St. Louis 4, Missouri.

Santicizer: Reg. U. S. Pat. Off.

Tests prove SANTOCEL C the ideal FLATTING AGENT for flat and semi-gloss varnishes

Santocel C—outstanding in its success as a flatting agent in lacquers—is now a *proved* additive for producing improved-quality flat and semi-gloss varnishes. Monsanto research has explored and developed the incorporation of Santocel C with practically all types of varnish vehicles . . . found the quality-building characteristics of Santocel C unequalled by other flatting materials.

Briefly, Santocel C offers the following proved advantages:

1. **Insoluble—Varnishes containing Santocel C will not lose flatting efficiency in shipment or during normal storage conditions.**
2. **Permanent—Santocel C becomes a physically permanent part of the varnish film.**
3. **Strengthens—Santocel C contributes better hardness and mar-resistance . . . does not impair film strength.**
4. **Efficient—Santocel C is two to four times as efficient as any other known flatting agent.**
5. **Stable—Santocel C does not develop a haze and is suitable for baking applications.**

Santocel, Monsanto's unique silica aerogel, is a fine, free-flowing form of silica. It is extremely light (6 lbs. per cu. ft.), microscopically divided, and has an enormous surface area (67.25 acres per pound).

Flatting difficulties reported by manufacturers led Monsanto research to an extensive investigation of the flat varnish problem. In Santocel C, Monsanto can now offer varnish manufacturers a simple method of blending this effective flatting agent into practically any type of varnish.

To get the complete story, send for your copy of Monsanto's new progress report, "The Successful Incorporation of Santocel C in Flat Varnish." Address Monsanto Chemical Company, Merrimac Division, Dept. S-12, Boston 49, Mass. *Santocel: Reg. U. S. Pat. Off.*

Many Monsanto intermediates now available to industry

Monsanto continues to serve the chemical process industries with a wide range of highest grade intermediates. Although some products in this category are still in short supply, many are now available for immediate shipment in quantity. Availability information, prices and samples will be furnished promptly on request . . . Address your inquiries to Monsanto, Organic Chemicals Division.

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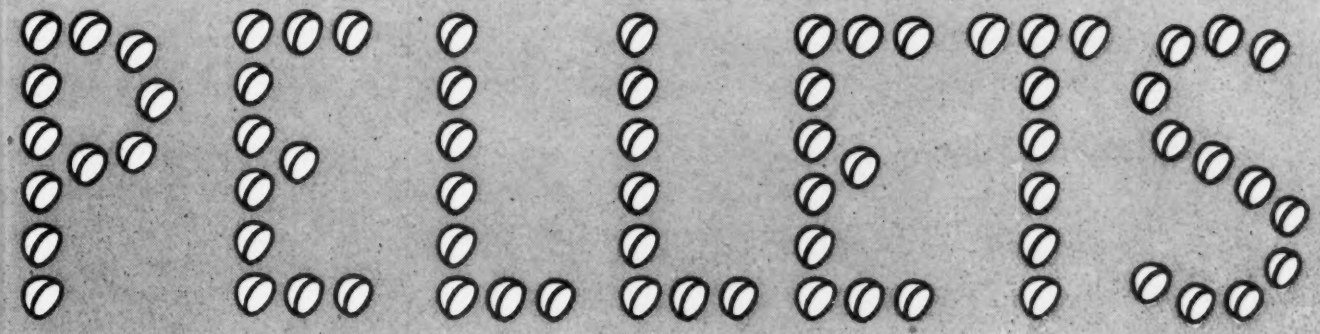

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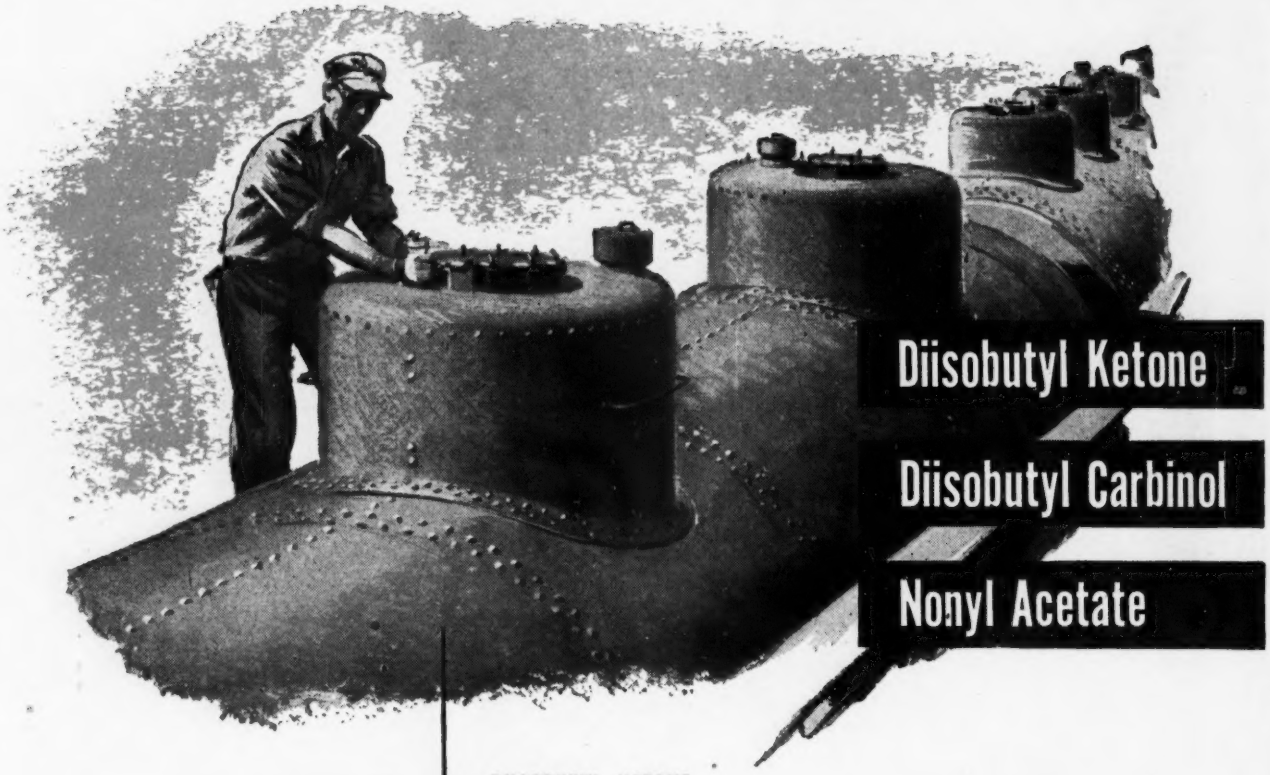

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Chemical Industries

THE MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

Newsletter,
December, 1948.

For Your Information:

A few test samples of a quaternary ammonium compound, an alkylbenzyl trimethyl ammonium chloride, are now being distributed by Oronite Chemical Co. Markets are being sought not only in the germicide field, but also in flotation and general surface-active applications.

Tonnage oxygen (CI, April, 1948, p. 565) is booming throughout the world: Canadian Liquid Air Co., Ltd., which represents the Air Liquide Society in Canada, is building a 350-ton-per-day plant for International Nickel Co., a 100-ton plant in Holland, and two smaller plants in France.

* * CI * *

A new, continuous, vibrating tray dryer, to replace shelf tray dryers for granulated materials, has been designed by Jeffrey Manufacturing Co., Columbus, O. The first commercial installation was completed this month at Wm. S. Merrell Co.'s Cincinnati plant, where it is being used on granulated drugs. Operating savings over the shelf dryers are said to be substantial.

Bakelite Corp. will eventually move all its Toronto, Ont., operations to its new plant now under construction at Belleville, Ont. (midway between Toronto and Montreal). The Belleville plant will materially increase Bakelite's Canadian capacity for phenolic and urea resins.

Incidentally, reports carried by local papers in Marietta, O., and Parkersburg, W. Va., to the effect that Bakelite will build a large new phenol plant at Marietta, are incorrect as of this writing. It was claimed that the plant would be adjacent to sites recently purchased by Electro Metallurgical Corp. and National Carbon Co. Bakelite is definitely planning to erect a phenol plant, but no location has been decided upon. Marietta is one of several sites being considered.

* * CI * *

An extremely fast, "suspensionless" electronic balance, in which the increment of electromagnetism necessary to support the pan is a measure of the weight, has been developed by Collins Radio Co., Cedar Rapids, Ia. Commercialization is presently im-

peded by the pressure of contracts and the shortage of skilled workers, but the company believes it can eventually bring out a model in the price range of the chain-type balances. Long-range plans envision a series of balances, from a simple one in the $300 range to a super-sensitive model priced around $1,000.

* * CI * *

The Drackett Co., Cincinnati, has a new wax, derived from soybean fatty acids, under pilot-plant development. The new material falls in the medium-hard classification—midway between beeswax and carnauba. Also in the development phase is a new soybean protein that maintains constant adhesive properties at varying viscosities.

The polystyrene dashboard of the '49 Nash represents the first manufacture of a major automotive part from plastic lower in cost than metal stampings. The Logoquant surface-protection treatment, developed by Bjorksten Research Laboratories under a Nash-Kelvinator contract, is credited with making the fabrication possible.

* * CI * *

General Electric Co. is marketing a new polymeric-ester plasticizer, Glyptal 2557, which is compatible with cellulose plastics, alkyds and vinyls.

Makers of wick-type deodorants are eyeing with trepidation an aerosol household deodorant, Vamoos, now being marketed by Vamoos Products, Inc., Chicago. The material—available in pine, lavender, or unscented—comes in a 12-ounce can selling for $1.98. Distribution is presently confined to the Chicago area, but it will gradually be extended.

* * CI * *

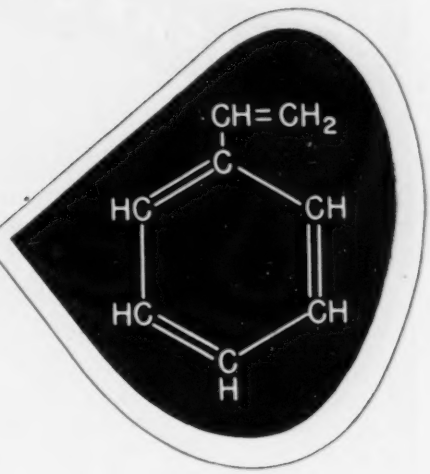
Here and There:

Tennessee Products & Chemical Corp.'s $500,000 fine chemicals plant at Chattanooga is expected to be in operation by March... Straw in the wind? One acrylics fabricating plant has cut production 40 per cent as a result of accumulated inventory... Southern Naval Stores Co., Columbia, Miss., is attempting to buy the government-owned wood-hydrolysis alcohol plant at Springfield, Ore. If the deal is successful, the company will produce alcohol and molasses...The Western States Council, composed of chambers of commerce of eleven Western states, is studying Wyoming natural gas and California refinery gases as possible raw materials for new anhydrous ammonia production...Reynolds Metals Co. has patented (U.S. 2,448,000) the production of alkaline-earth metals from their oxides by reduction with metallic aluminum...A fuel for internal combustion engines, composed of ammonium nitrate dissolved in liquid ammonia, has been patented (Can. 493,217) by Canadian Industries Ltd....Metal Hydrides, Inc., Beverly, Mass., is supplying research quantities of lithium deuteride (heavy hydrogen) and lithium aluminum deuteride on orders licensed by the AEC.

The Editors

FOR POLYMERS AND COPOLYMERS

Koppers Styrene Monomer



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Styrene Monomer is used by producers of specialty copolymers, plastics, ion exchange resins, polyester laminating and casting resins, and for chemical synthesis.

The price of Koppers Styrene Monomer is astonishingly low for a synthetic organic chemical of this purity. Its chemical reactivity combined with low price suggests careful examination of Koppers Styrene Monomer for use as a chemical intermediate. Send for more information and a free sample.

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CONGRESS MUST RULE ON PRICING POLICY

Guest editorial by WILLIAM SIMON,
Chief Counsel, Senate Trade Policies Committee

AFTER TWENTY-FIVE YEARS of litigating various phases of delivered pricing practices, the Federal Trade Commission achieved success in 1948 when the Supreme Court and Circuit Courts of Appeals affirmed its orders in the Cement Institute, Rigid Steel Conduit, and Pittsburgh-Plus cases.

The decisions in these cases and the arguments advanced by the Commission during those proceedings have enveloped in uncertainty all pricing practices, in industries where freight is a substantial part of the delivered cost, other than f.o.b. mill selling. Substantial numbers of businessmen now urge Congress to amend the law to permit uniform delivered prices, uniform zone prices, and freight equalization or freight absorption to meet competitors' lower prices, when such systems are practiced individually and not pursuant to a conspiracy or agreement.

It is of the greatest importance that the issues which must be decided by Congress be clearly understood by both the legislators and the people, for otherwise the proper answer to the problem may not be reached.

If the Commission's pricing policy is limited to conspiracy cases, there is no occasion for concern by anyone. If its policy is limited to the question of who pays the freight bill, the issue is not of vital importance to our American economy.

The real issue we must face is: What will be the effect on our entire national economy of the Trade Commission's pricing policy? Will that policy impair or will it promote our American competitive industrial system?

THE VALIDITY OF ANY PRICING PRACTICE must be measured by the provisions of the Sherman Anti-Trust Act, the Federal Trade Commission Act, and the Robinson-Patman Act.

The Sherman Act outlaws all conspiracies in restraint of trade. This includes conspiracies to fix prices through the use of f.o.b. selling. To the extent that the Commission's activities in the pricing field are confined to conspiracy cases, it required none of the other legislation previously referred to, for price fixing conspiracies have been illegal since the Sherman Act was passed in 1890.

The Trade Commission Act authorizes the Commission to outlaw unfair methods of competition. The statute does not define that phrase and neither the Court nor the Commission has ever done so. In a statement of policy issued by the Commission on October 12, 1948, it advises that *knowing parallel conduct* is an unfair method of competition and illegal. The Commission concludes that identical prices are collusive and illegal regardless of whether they result from conspiracy or from competition.

In the Robinson-Patman Act, the key is the Commission's philosophy that price means the seller's mill net return. It is the Commission's view that a seller who sells the same product at the same delivered price to two customers who are located at unequal distances from his plant, receives varying mill net returns. Such varying mill net returns are discriminatory and they are illegal whenever they may injure competition.

The Commission's complaint against the cement industry charged a conspiracy to fix prices through the use of the basing point system. Its order found such a conspiracy. But when the case reached the Supreme Court, the Commission injected the mill net theory into the case. It then argued that the cement companies' pricing policies resulted in illegal price discriminations irrespective of conspiracy or agreement. And its spokesman expressly conceded that a nondiscriminatory pricing practice in that industry required uniform f.o.b. mill prices.

But the Commission just as expressly avoids giving any yardstick by which the legality of *any* pricing system may be determined. Its philosophy is that the Commission must be free to judge the legality of each case, on the individual facts in that case, after litigation before the Commission.

THUS AT A MAXIMUM, f.o.b. mill selling is required in virtually every American industry, and at a minimum a seller can never know in advance of litigation with the Commission whether any pricing practice, other than f.o.b. mill selling, is legal. It thus seems clear that any seller, in an industry where freight is a substantial part of the delivered cost, can only sell with assurance that his pricing system is legal if he employs a uniform f.o.b. mill price. At the public hearings of the Senate Trade Policies Committee, three of the principal attorneys for the Federal Trade Commission have confirmed that conclusion.

There may well be many economic advantages of uniform f.o.b. mill selling. These advantages may well offset all of the disadvantages of f.o.b. mill selling. But so important a change in our national economy should only be put into effect at the expressed direction of the Congress. It now appears that such pricing philosophy is being imposed upon industry under statutes designed largely to prohibit unfair price discriminations in favor of chain stores and to prevent unfair methods of competition largely in the form of false advertising.

The Congress must determine when, if ever, any seller is to be denied the right to compete for any business, in any market, with any competitor, under any pricing system including the absorption of freight, so long as he does not act pursuant to a conspiracy or agreement.

It seems clear that the Congress must determine what pricing practice will best promote our free enterprise competitive system and put it into law in such clear language that businessmen who want to be law-abiding citizens may know what conduct is required of them.

What's new

SPECIALTY SLEEPER SPARKLES

Glass Wax forces change in glass cleaner field, emphasizes potential of unexploited chemical specialties.

HAL SCHAFER is a pleasant fellow with a winning smile and a habit of waking up in the middle of the night. One 2 a.m. as he sat on the edge of his bed in a hotel room in Minneapolis he had an inspiration for the name of his new glass and metal cleaner: Glass Wax.

The conditions surrounding the birth of the name that is the envy of all in the chemical specialty business were quite in keeping with the subsequent success of the product it describes. While manufacturers of glass cleaners and metal polishes felt secure with their traditional formulas and packages, Schafer was preaching his new doctrine to housewives across the nation in a spectacular blitz advertising campaign. By the time others in the business were rubbing the sleep from their eyes, the revolution had been accomplished. Solvent and abrasive cake glass cleaners were warming shelves as consumers shouted for Glass Wax, and the manufacturers of brass polish were kicking themselves for treating a prince like a pauper.

Me Too

There followed the second greatest "me too" campaign in recent history. While some manufacturers refused to join the undignified scramble for the consumer's fifty-nine cents, others showed no hesitation in leaving a lofty plane to adopt similar formulations, similar packages, and the identical trade name which Schafer's Gold Seal Co., Bismarck, N. Dak., has registered as a trade mark with the U. S. Patent Office and in 39 states.

Gold Seal has sued and been countersued in litigation carried on since last spring. Gold Seal's rights should be clarified when the four Jacobs brothers (Bril-Yant Products' Waldorf Glass Wax) appear in Federal court in February to pursue their claim that the term has no significance as a trade mark. However, since the product contains no wax as the public knows it, Gold Seal insists that the name is not descriptive, but arbitrary and fanciful. The company wants all profits obtained by use of the name and treble damages from companies seeking to ride on the coat tails of its effective and expensive advertising compaign. Other companies using the name include Tidings Corp. of America (Ticora Glass Wax), Glas Wax Corp. (Flash Glass Wax), R. E. Robertson & Co. (Sparkle Plenty Glass Wax), and Boyle-Midway, Inc. (Wizard Glass Wax).

H. SCHAFER: In the still of the night.

Schafer is not concerned about those companies that have broken into the act without lifting his trade mark, since he thinks he can hold his market. Other imitations came out immediately, but many manufacturers of standard window cleaners stuck to their guns until they saw the decks awash. Some time ago Boyle-Midway, Inc., brought out its Wizard Glass Wax, although it still markets Aeromist; while the Drackett Co., maker of Windex Spray, has just introduced Windex Wax. One of the last of the old-timers to follow is the Bon Ami Co., which is offering Bon Ami Glass Gloss to "complement" its cake and powder cleaners because of consumer demands. Its distribution has thus far been limited to the West Coast and Texas, but it will be national eventually. Among other big compaines, Simoniz Co. has just made its Window Glaze a national item; Sherwin-Williams has begun distributing its S-W Glass Polish to grocery chains, department stores, and its paint dealers; and C. B. Dolge Co. is offering Glass-Met.

Old Stuff

Sour grapes have been the diet of brass polish manufacturers since the success of the "new" glass cleaner. They remember metal polish was used on windows thirty years ago, but the abrasives were too hard, and there were complaints that the powder formed upon drying dirtied window sills and rooms. Porters in many buildings, however, have long done brass and door windows in one fell swoop, but the possibilities of such a retail item were overlooked. Today most of the metal polishes belatedly carry the legend, "cleans glass and mirrors." Noxon's advertisements ask, "Why pay for water?" and suggest fifty per cent dilution to give a glass cleaner.

In general, the new glass cleaners are similar to metal polish, but the solids are lower, the abrasive is softer, and the solvent evaporates more quickly. Because they are recommended as silver polish, the abrasive must be absolutely grit-free as contrasted with the sharp, hard particles found in the usual brass cleaner. Six to eight per cent by weight of a diatomaceous clay of very fine particle size and a fine bentonite clay (as a suspending agent) is standard in most products. This both cleans and provides a large surface for rapid evaporation. About fifteen per cent solvent helps to dissolve grease and aids drying. Stoddard solvent is very popular, although isopropyl alcohol and Cellosolves are also used. A little less than two per cent aqua ammonia is of value in cleaning both metal and windows, and has the psychological advantage of an odor the housewife associates with cleaning. Most of the cleaners are designed as emulsions, although variations in stability are almost as great as the number of manufacturers. No synthetic detergents are used as such, although some of these emulsifiers have such action. One to two per cent of a suitable emulsifying agent, about seventy-five per cent

water, and a bit of dye complete the list of ingredients with the exception of the "wax."

No Wax?

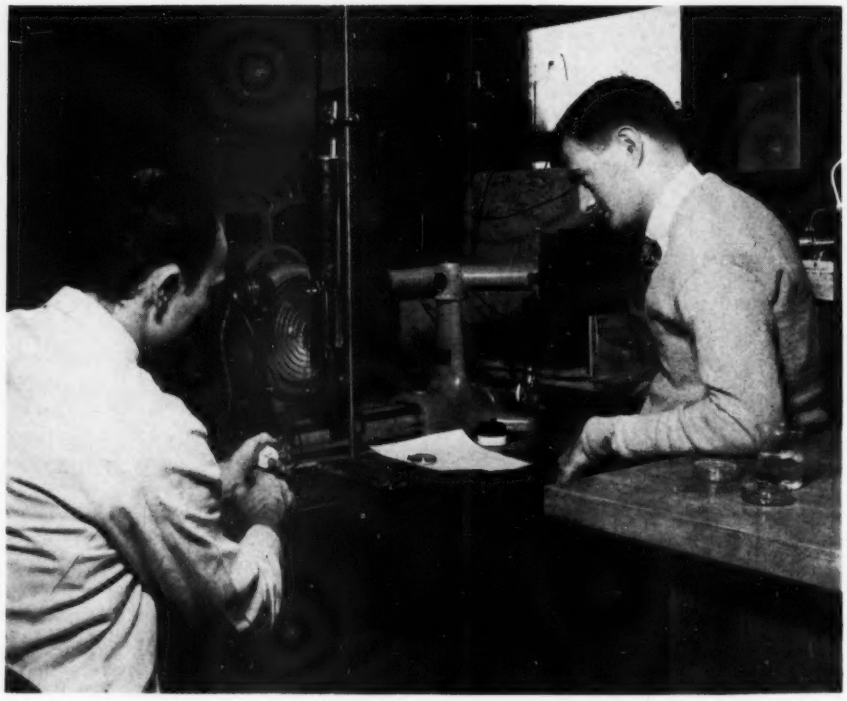
The idea of waxing a window doesn't appear sound to many people, but several products contain wax. It is doubtful that it is present in a concentration high enough to be effective as a wax, for it would seem hard to clean a window with such a mixture. Many do contain silicones which remain as film on the glass. This possibly protects against fogging and keeps grime from being imbedded in the glass. Whether or not a cleaner contains a wax-like material can be determined by a drop of water on a newly cleaned surface: if it spreads out, it doesn't; if it balls up, it does.

$4 Million a Year

With the retail sales of Gold Seal Glass Wax alone estimated at better than $4 million a year, it is small wonder that specialty men are anxious to tap this rich market, growing richer under heavy advertising support. More women are buying window-cleaning compounds than before, and the versatility of the product (in addition to silver, brass, and glass, it cleans tile, refrigerators, gas stoves, cars, etc.) promotes its use. R. M. Hollingshead Corp., which makes Gold Seal's Glass Wax, has been kept busy as the nation's women, satisfied with the "wipe it on, wipe it off" feature, reorder in fabulous numbers.

The increased demand for the ingredients going into these cleaners—particularly the abrasives and solvents—has more than offset any decrease in the use of solvents formerly ordered for the liquid-type cleaners. The latter are still being made, for there are some women who find the new cleaners objectionable: the dust from the dried abrasive gets on rugs, in scratches of the glass, and in small corners. Some companies which manufacture both, vote for the old-style "squirt on" type and think women will come back to them.

In the meantime, Schafer carries on with his lawsuits and sales, and tries to keep tabs on his growing number of competitors (now at least twenty). The latter is difficult, for the seventy-five per cent water in the formula makes it a natural for the local entrepeneur. The edge he has on shipping charges enables him to give local retailers a much better markup than national distributors. While such men are busy exploiting this advantage, other manufacturers are scrutinizing their lines for another sleeper that may have a spectacular future in the lush chemical specialty market. They're even staying awake nights—sitting on the edge of the bed, thinking.



SCOTT and SINSHEIMER: Frozen molecules stay put.

QUIET MOLECULES

Low - temperature spectroscopy gives better information on molecular structure.

NO TEEN-AGE hep cat can hold a candle to an ordinary molecule when it comes to quick, crazy gyrations. And just as it's easier to get a good look at the jitterbug when he's sitting down, so is it more revealing to study a molecule when it's resting quietly at low temperatures.

Consequently, a new method developed at Massachusetts Institute of Technology for low-temperature spectrographic analysis is yielding results that promise unusual precision.

Members of the M.I.T. Biology Department believe that their new technique, used thus far only in the case of certain biologically-important compounds, may have important advantages in other chemical fields as well.

Studies of low-temperature spectroscopy at M.I.T., supported by a research grant from the American Cancer Society, are under the direction of John R. Loofbourow, professor of biology. Working with him are Jesse F. Scott and Robert L. Sinsheimer, both research associates in the department.

At room temperature, various physical factors arising from the heat motion of molecules results in loss of detail in the information obtained by absorption spectra. This circumstance itself suggested the possibility of obtaining more detailed information about chemical molecules by applying spectroscopic methods at low temperatures obtained by means of liquid nitrogen or hydrogen.

Cooled Quartz Slides

The M.I.T. researchers' method is to prepare thin films on quartz slides of the substances under study, either by sublimation in a molecular still (in the case of purines, pyrimidines, and amino acids) or by drying water solutions (in the case of nucleotides and proteins).

This increased spectral detail obtained at low temperatures, predicts the group, should be very useful for identifying chemically-important substances when they are intermixed with other compounds of similar structure.

They also expect the greater detail of the new method to help unravel some mysteries of the structure of such substances, and of the relationships between chemical compounds and biological processes.

To date, some 25 compounds have been studied by low-temperature spectroscopy in the biology laboratories at M.I.T. Much additional work is contemplated, in order to cover systematically a larger range of chemical substances.

Helium Next

Eventually, Loofbourow and his associates expect to work at liquid helium temperatures, very close to absolute zero. They hope also to be able to reduce the size of their sample until they may eventually be able to analyze the chemical com-

position of single cells. The importance of such a possibility to a fundamental study of the nature of cancer justified the American Cancer Society's support of the project. In the meantime, Loofbourow believes that results of immediate value to the chemical world may already have been achieved.

DRY-CLEANED SUGAR

New sugar refining process employs solvent extraction of impurities, promises cheap commercial grade.

WHEN DON OTHMER and Art Luley of Polytechnic Institute of Brooklyn started work on refining sugar by solvent extraction several years ago, they had little hope of producing a purer product than that of a standard refinery, for sugar is about the purest tonnage material made. They did see many opportunities to cut down on construction and operating cost of the conventional installation where sugar must be melted (dissolved in a very concentrated solution) and decolorized with bone black, then evaporated and recrystallized.

Their new refining process, on which pilot-plant evaluation has recently been completed, confirms both their fears and hopes. In removing impurities from raw sugar by extraction with hot methanol, the crystals are not dissolved. Consequently instead of a white product, they get one with a faint yellow color caused by impurities built into the matrix of the crystal in the initial extraction from cane. On the credit side are many advantages that have caused industry to show considerable interest: production cost should be low; the product is of high purity (99.7 per cent), contains no bacteria, and can be sold where color is not a factor; and a molasses high in vitamin content is obtained.

Methanol the Best

To refine sugar by a combination extraction-flotation method, a solvent that would dissolve impurities but not sucrose crystals was sought. Out of a number of solvents tried, methanol and acetic acid worked best. Acetic acid was ruled out because of its corrosive action on equipment and the danger of inverting sugar in the acid medium. Methanol's cheapness and low boiling point were other factors in its favor. As it is completely removed from the product, there is no danger of poisoning.

In the process, raw sugar is fed into a horizontal extractor and is carried countercurrent to hot methanol by a stirrer that acts both as a mixer and conveyor. While agitation must be sufficient to remove the coat of molasses and adhering impurities by attrition, it must not be violent enough to break the crystals. Methanol that has been heated close to boiling in a heat exchanger is continually added to the extraction unit while that containing impurities in suspension and solution goes to a settler. After the settled solids are removed, the solution goes to storage from which it is fed to the distillation column. Here the methanol-soluble material is separated as bottoms; methanol is taken overhead for recycle.

D. F. OTHMER: Bone char by-pass.

A light brown, free-flowing crystalline sugar with a maximum of 99.7 polarization (equivalent per cent sucrose) is obtained in 95 per cent yield as the main fraction from Cuban raw sugar. This is comparable to a grade known as "turbinado" (Spanish for *centrifuge*, since that is the means of refining). This is sold as a consumption sugar in some countries and is used here to some extent in bakery goods, candy and soft drinks. The methanol treatment, however, leaves a product with no bacteria and few thermophilic spores—superior in this respect to both turbinado and fine granulated sugar.

The methanol-insoluble solids (0.47 per cent of the charge) recovered from the settler are about half sugar and half dirt. This would be dissolved in water and the dirt filtered off. The filtrate could be handled in a conventional refinery.

Two other fractions are recovered—both from the distillation bottoms: 1.7 per cent of the starting material as solid sugar, and 2.74 per cent as molasses. Toluene extraction of the sugar yields a wax and chlorophyll, but it seems most feasible to add this to remelt sugar of a bone-char refinery. The molasses has about the same composition as refiners' syrup and is marketable as such. An additional sales feature is its unusually high vitamin content (eleven times as much niacin and five and one-half times as much pantothenic acid as blackstrap molasses).

Solvent Recovery

An operating ratio of one pound of methanol to one pound of sugar was found most desirable. The sugar in the pilot plant was merely air-dried with no attempt at methanol recovery. This, and the use of equipment that was not tight, resulted in a methanol loss of seven per cent. Since Othmer figures that solvent loss cannot exceed one per cent if the process is to be economically sound, methanol recovery will make or break it. All equipment will have to be vapor-tight and the methanol from the dryer will have to be recovered.

Patents on the process have been applied for, and the cane sugar industry has shown much interest in what could be the first fundamental change in refining in fifty years. (Beet sugar is extracted differently, so the purification of "raw sugar" is not applicable.) The new process should require an installation costing only a fraction of the usual refinery investment. In foreign countries, where the grade would be suitable for consumption, it should have an edge over turbinado sugar which is produced in poor yield. In this country, which has a smaller sugar capacity and larger sugar

consumption than before the war, it would ease the strain on existing facilities.

Although an independent plant should be economically sound, Othmer feels that operation in conjunction with a bone char refinery would be most feasible. The extraction unit would actually run independently, but fractions other than the sugar would be turned over to the conventional unit for processing. If not sold separately, the molasses could be blended with refinery molasses. The remaining fractions would be purified in the usual manner.

At present some turbinado sugars are produced and consumed in this country. Tariffs have discouraged their importation and wider use. Installation of "dry-cleaning" plants, however, would make this cheaper commercial grade available. Food processors, especially canners, would favor it not only for its low cost, but also for its freedom from bacteria.

CITRATED SOY

Citric acid prevents development of off-flavors in soybean oil.

IF SOYBEAN oil were capable of experiencing subjective emotions, it would undoubtedly suffer from an inferiority complex due to a complex inferiority: Unlike its cousins, corn oil and cottonseed oil, it quickly loses its bland flavor, becomes "painty" or "fishy," as a result sells for fewer cents per pound.

Although soybean oil is now the country's major edible oil, its poor flavor stability has cost the farmers—who grew 200 million bushels of the beans in the U. S. this year—a considerable loss of money.

Citric Helps

Now H. J. Dutton, in charge of oil investigations at the U. S. Department of Agriculture's Northern Regional Research Laboratory, at Peoria, Ill., has discovered that citric acid improves the initial taste of soybean oil and preserves the flavor 3 to 5 times as long as previous oil-refining methods. Very little acid is required: 3 or 4 ounces is enough to process a ton of oil.

Work at the Laboratory began in the summer of 1945. American investigators in Germany learned that the Germans had been adding citric acid to soybean oil for the same purpose, and Department of Agriculture workers checked the results, found that the process worked. Delving further, they discovered—what the Germans hadn't known—that the real function of the citric acid was to neutralize the effect of trace metals that got into the oil from the refining equipment. It is known (CI, Nov. 1948, p. 766, "Fettered Ions") that traces of metals catalyze development of rancidity in many organic materials; and citric acid has been used in lard to counteract the catalytic activity of copper traces in promoting decomposition.

Commercial soybean-oil processors have cooperated with the laboratory in industrial-scale tests of the process, which have confirmed laboratory findings.

Not Final Answer

This discovery will be a boon to the soybean farmers and oil processors—and equally to the housewife who buys soybean oil-based shortening, margarine and salad oil. But the Laboratory's chemists recognize that citric acid isn't the final answer: Flavor stability can be increased only to a limited degree by this mode of attack. More needs to be known about the chemistry of the oil—about the agents that cause flavor reversion.

H. J. DUTTON: A complex inferiority.

At the same meeting where Dutton presented his discovery—the annual meeting of the American Oil Chemists' Society in New York last month—another speaker, W. G. Taylor of Lever Bros., revealed some of the difficulties the investigator must face. He extracted a soybean oil under carefully controlled conditions, degummed it twice, hydrogenated it to shortening and tested it for heat-flavor reversion. It was no better than normally processed, commercial-grade oils. In another experiment he exhaustively extracted the unsaponifiable matter from soybean oil and reconstituted the glycerides. This unsaponifiables-free oil he hydrogenated to shortening and again tested for heat-flavor reversion. Again it was no better. And the unsaponifiable fraction, added to cottonseed oil, did not confer the inferiority of reversion on that oil.

The problem of flavor reversion is the most serious faced by the soybean industry. It's a tough nut to crack, but the Department of Agriculture, through its own laboratories and cooperating research organizations, is out to find a more fundamental answer than citric acid.

RESIN-PAPER COUPLER

Impregnating paper with urea-formaldehyde resin before laminating with a low pressure polyester gives superior laminates.

THE ELECTRICAL insulation industry has long known that the inadequate moisture-resistance of polyester resin laminates was too great a deficiency to permit their use. Now, however, Rohm & Haas Co.'s Resinous Products Division has developed a method of making low-pressure polyester laminates equal or superior to laminates produced by impregnation with phenolic resins under high pressure.

Polarity Rules

It is well known in the high-pressure laminating industry that a low-molecular-weight, water-soluble phenolic resin will thoroughly penetrate cellulose fibers to give a laminate of high rigidity, low impact, good dimensional stability, and water resistance. The less polar alcohol-soluble resins, on the other hand, do not impregnate but merely coat the fiber, giving a laminate of higher impact strength, but of lower rigidity and poorer dimensional stability in water.

Cellulose-polyester laminates fall into the latter category; consequently they are not stable under conditions of high humidity. For many applications certain desirable properties of the resins have overbalanced this handicap; but the electrical industry, the largest consumer of high-pressure laminates, insists upon complete dimensional stability under all conditions of humidity. Means were sought, therefore, to waterproof the cellulose fiber and make the surface less polar, and thus more receptive to the less polar polyester contact resin.

Urea-HCHO Steps In

Polarity of the cellulose fiber was reduced by pretreatment with a low-molecular-weight urea-formaldehyde condensation product, Uformite 609.

Fifteen-ply canvas laminates were Uformite-treated and then laminated with low-pressure polyester resin (Paraplex P-43, a styrene solution of an unsaturated alkyd). These were compared with samples prepared in the same manner except for the pretreatment. The non-pretreated samples were distinctly inferior to available phenolics in dimensional stability, but the

Uformite-treated samples were essentially equal to the phenolic-impregnated product in that they swelled less upon soaking and shrank to the original dimensions upon redrying.

Similar tests indicate that pretreatment of paper can bring low-pressure, contact-resin laminates into competition with commercial grades of paper laminates made with phenolics under high pressure.

COATS FOR SEEDS

New process of pelleting seeds permits precision spacing, incorporates ingredients for proper growth.

IT'S A WELL known axiom of the prize ring that a good big man can take a lot more punishment than a good little man. The newest segment of the seed industry has apparently applied that truth to the problems of planting: Seeds are given a coat which increases their size to permit uniformly-spaced planting and provide protection against weather hazards and fungi. Although much of the work is still in the experimental stage, a large number of vegetable—notably tomato, sugar beet, and corn—and flower seeds have been sold commercially in this "pelleted" form, and both volume and variety are definitely on the increase.

About five years ago, when he was employed by the Dow Chemical Co., Phelps Vogelsang began work on the pelleting of seeds which led to the original patent on his process. Dow, to whom the patent is assigned, has granted him exclusive manufacturing rights, and as acting president of Processed Seeds, Inc., Midland, Mich., he does custom pelleting for other seed companies, canners, and the like.

Like the Sweety Barrel

The seeds are coated with inert materials while rolling free in a batch process. Water-soluble methyl cellulose acts as the binder for the inert material which varies somewhat with the type of seed being processed. The coating will soften or disintegrate in the soil when there is enough moisture present to allow germination. Any safe amount of fungicide, insecticide, fertilizer, minor elements, and stimulants that will control diseases and insects and promote growth of healthy seedlings can be added in the coating. In general, sufficient quantities to take care of the plant throughout its growth cannot be added to the seed, but there are certain advantages of such addition. On onions, for instance, putting 100% of the seed weight of tetramethylthiuram disulfide in the coating is the best smut control method known. Dried blood makes a ready supply of nitrogen available, and hormones and vitamins hasten emergence,

PHELPS VOGELSANG: Tailor to seeds.

while crow and rodent repellents cut the loss from this source in surface plantings.

Filtrol Corp., Los Angeles, Calif., produces its Filcoat seeds by a similar process on a similar basis. In that quarter, it is felt that incorporation of fertilizers, fungicides, insecticides and the like is of little practical value. Tests have shown that the pelleting with what is primarily an aluminum silicate containing most of the trace elements needed for plant growth provides sufficient protection. Filtrol will incorporate any additives its customers desire, but advises close study of the locality in which seeds are to be planted in order that the most beneficial ingredients may be selected.

Size the Big Factor

Although protection and the possibility of adding nutrients are of great advantage, the primary purpose for coating seeds is to increase their size. Whether sowing is done by hand, or by hand or power seeders, the seeds can be uniformly spaced instead of being scattered as has been done with small seeds. Not only does this result in a considerable saving of seed, which often is expensive, but it eliminates the work of thinning and transplanting. Moreover, because the pelleted seed can stand more vigorous conditions of weather, it can be planted two or three weeks ahead of bare seed or transplants.

Almost any seed can be coated. In its catalogue, Processed Seeds lists 28 different kinds of vegetable, grass, and tree seeds that it coats commercially, and a variety of flowers that are handled on a special basis. Last season's planting with its seeds included 40,000 acres of sugar beets, 12,000 acres of tomatoes and 8,700 acres of conifer tree seeds for aerial seeding.

Filcoat tomato seeds have given growers unexpected benefits, not only in eliminating transplanting, but in earlier and heavier picking, and comparatively disease-free fields. Similar results have been reported on lettuce, cabbage, cauliflower, broccoli, Brussels sprouts, onions, carrots, alfalfa, and flowers, and experiments indicate that cotton growers will benefit by such processing. Petunia and tobacco seed, which are quite small—over 5 million to the pound—have been successfully coated to allow utilization of every seed.

National Distribution

Among seed companies offering the new variety is Corneli Seed Co., St. Louis, Mo., which has been experimenting for four years, and last year sold pelleted tomato seed to growers. The Burgess Seed & Plant Co., Galesburg, Mich., is about to enter its second year of national distribution to the gardening public after several years of tests. Its 1948 offering evoked such enthusiastic response that this year the list of available seeds is to be increased, and bulk quantities will be offered as well.

On the other side is the Ferry-Morse Seed Co., Detroit, Mich., one of the largest seed houses. It feels there is still more research to be done before it can sell and recommend the new seeds on a commercial basis. From other sources have come reports of disappointing results, but the pelleting boys think that when the seeds are properly handled, they are better than the uncoated.

One of the most promising applications is reforestation and reclamation work. Direct planting of seeds will eliminate costly nursery work, and pelleted seeds of range grasses stand a better chance of survival in semi-arid areas than bare seeds. Processed Seeds is pelleting several thousand pounds of range grass seed for aerial seeding, mostly in Idaho. Another man doing similar work is Lytle Adams who mixes seed with soil and stamps out the pellet with a machine. The pellets from this process contain multiple seeds, while Vogelsang's are single seed pellets. In addition to added weight for distribution, the coated seed will take root on surface soil and can be protected from predatory birds and rodents.

Cost

The price of the additional processing will vary with the seed and the materials incorporated in the coat. In practically every instance the savings in seed; labor in thinning, blocking and transplanting; stronger plants; and higher yields per acre pay for the pelleting. Although the initial cost per retail package will be slightly higher than bare seeds, the actual

cost per area for seeds will be considerably less.

The trade does not anticipate any increased demand for fertilizers or insecticides to result directly from the process, although the use of fungicides may be stimulated. Any influence will stem from increased attention growers are giving to proper seed-bed preparation and proper culture of crops. Farmers who see the advantages that accrue from use of the new seeds and the scientific farming are more likely to be interested in proper fertilizers and other chemicals for agriculture.

FLOUR FLURRY

New Food and Drug Administration ruling bans use of NCl_3 for flour bleaching.

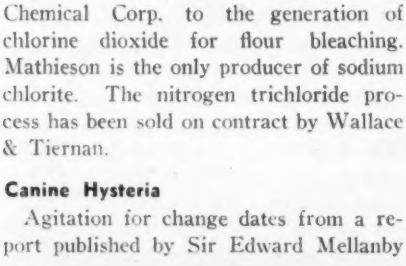
ANOTHER change in markets for chemical products is presaged by the recent order of the United States Food and Drug Administration to the effect that the use of nitrogen trichloride for the bleaching of flour must be stopped by mid-1949. Bleaching with chlorine dioxide will probably be substituted, although chlorine, nitrosyl chloride, potassium bromate, nitrogen tetroxide, and benzoyl peroxide may also be used.

This change is expected to require a capital investment of approximately $2,000,000 and result, when substitution is complete, in annual chlorine and sodium chlorite consumption of not over 300,000 and 700,000 pounds respectively. (One gram of chlorine dioxide will bleach 100 lbs. of flour.) The installations will be made by Wallace & Tiernan Co. who have obtained sole rights from the Mathieson Chemical Corp. to the generation of chlorine dioxide for flour bleaching. Mathieson is the only producer of sodium chlorite. The nitrogen trichloride process has been sold on contract by Wallace & Tiernan.

Canine Hysteria

Agitation for change dates from a report published by Sir Edward Mellanby in the *British Medical Journal* of December 14, 1946, which noted that dogs fed on a diet consisting largely of flour bleached by the "Agene" (nitrogen trichloride) process developed hysteria. Control animals remained unaffected by a diet of unbleached flour. Dr. Conrad Elvehjem of the University of Wisconsin and other workers have confirmed Dr. Mellanby's results, extending their studies to cats, rabbits, and monkeys. Monkeys were not harmed, but cats and rabbits showed a certain degree of susceptibility. None of the experiments has indicated that human beings are injured by consumption of nitrogen trichloride-bleached flours; all pathological symptoms have been observed in experiments with animals.

No harmful effects, either in animals or humans, have been detected from the use of chlorine dioxide-bleached flour. Neither have any indications of injury been noticed after the use of the other bleaches mentioned above.



Ewing Galloway

WHITE BREAD: Safer for dogs.

How It's Applied

Chlorine dioxide is generated at the mill from sodium chlorite by reaction with chlorine in the presence of water. Chlorine dioxide is slightly more soluble in water than chlorine and must be stripped from the solution with air. The resultant gaseous chlorine dioxide then acts upon the flour to produce the bleaching effect.

Use of nitrogen chloride is similar in that the active ingredient must be generated on the spot. This reagent is produced by the reaction of chlorine with ammonium chloride in the presence of damp air.

MAGNESIA PAPER

Magnesium bisulfite pulping permits recovery of acid and organic wastes, eliminates pollution.

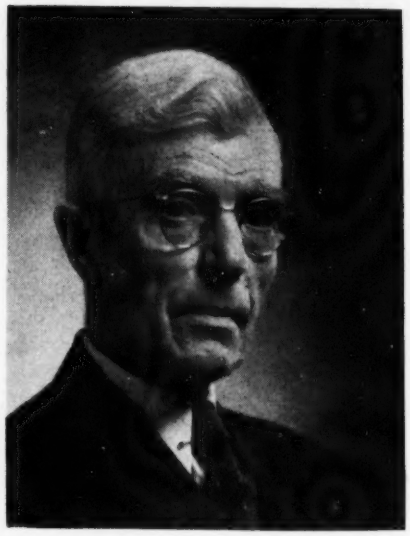
LIME is out and magnesia is in at Weyerhaeuser Timber Co.'s 275-tons-per-day pulp mill at Longview, Wash.* The new mill is expected to be the aspirin for an 80-years' headache of the sulfite pulping industry: disposal of the foul effluent, recovery of the pulping agent, and utilization of the waste organic solids (lignin).

Start-up of the converted mill last month marked the culmination of ten years' research and equipment development by Weyerhaeuser, Howard Smith Paper Mills, Ltd., and Babcock & Wilcox Co. In 1937 the latter two organizations began experimental work with a pilot unit at Smith's Cornwall, Ont., plant. Weyerhaeuser, meanwhile, was carrying out independent research along the same lines, and had constructed and operated a pilot plant at Longview. The three companies collaborated to prevent duplication of effort, eventually reached a decision that a full-scale plant should be installed by Weyerhaeuser.

* For news of another new pulping process see "Hardwood Rayon," page 941.

Magnesium Recycled

The spark that set the project off was the discovery by George H. Tomlinson of the Smith Mills that as a pulping agent raw material magnesia was unique: the waste liquors resulting from its use could be evaporated and burned to give a high recovery of the chemicals involved. Lime, the usual agent in sulfite pulping, cannot be recovered readily for two reasons: it forms a recalcitrant scale upon evaporation of the waste liquor, and the calcium lignosulfonate tends to reduce to calcium sulfide rather than to the oxide. Magnesia, on the other hand, is recoverable without difficulty and scale formation is no problem.



G. H. TOMLINSON: Burning is best.

In the new process wood chips are cooked in digesters under pressure with magnesium bisulfite. After cooking is completed, the pressure is relieved and the contents are dumped into huge horizontal tanks, whence they are pumped to knotters and pulp washers. The pulp is then separated and the residual liquor, with a solids content of 12 to 14 per cent, is neutralized with recovered magnesia to prevent loss of sulfur dioxide during evaporation. Multiple-effect evaporators concentrate the liquor to 50-55 per cent solids, and further concentration is carried out in cascade evaporators.

The concentrated liquor is burned in a jet spray furnace, analogous to a domestic oil burner, to generate steam in an associated boiler and to recover the magnesium in the form of magnesium oxide ash. The ash is carried off as a suspension in the

flue gases, collected in a series of cyclone separators, and conveyed in the form of a slurry to gas absorption towers.

Sulfur Also Recovered

The flue gases, meanwhile, are cooled and sent to the gas absorption towers where the magnesium oxide slurry descends counter-current to the rising sulfur dioxide, which it absorbs. Reaction of magnesia with sulfur dioxide in the presence of water gives magnesium bisulfite, the original pulping agent.

The recovered agent is fortified with magnesia and sulfur-burner gas to the extent necessary to compensate for unavoidable losses in the cycle. It is further fortified by the relief gases from the digesters and used again in the chip-cooking process, whereafter it enters on another cycle of chemical recovery and heat production.

At the Weyerhaeuser plant a single recovery and power department serves both the sulfite mill and a new 200-ton kraft mill.

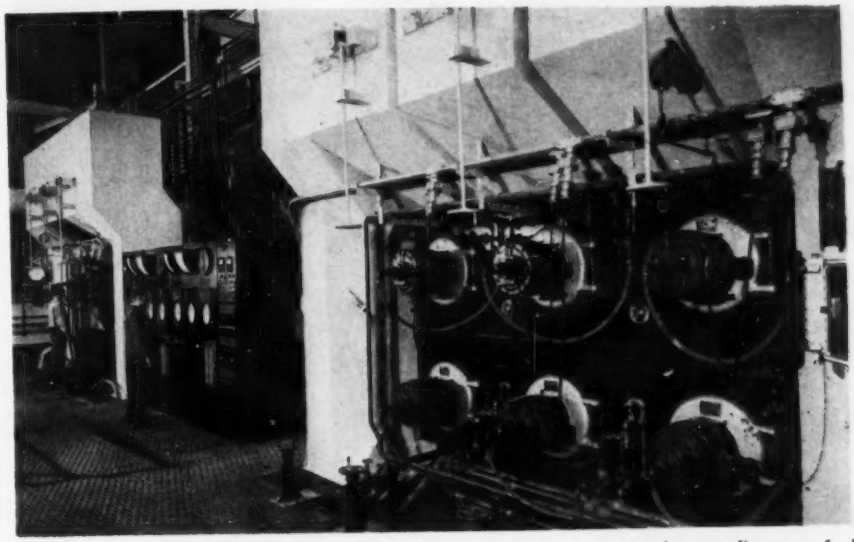
Weyerhaeuser Sees Advantages

Several solid gains are foreseen by Weyerhaeuser in the operation of the new process. First, the waste liquor—disposal of which has always been a serious problem—will be used up entirely. Second, the heat obtained from combustion of the organic solids and recovery of the pulping chemicals will offset the cost of evaporating large quantities of relatively dilute solution. Third, a higher-quality pulp will be produced because the greater solubility of the magnesium salts will permit their more complete removal from the pulp in the washing operation.

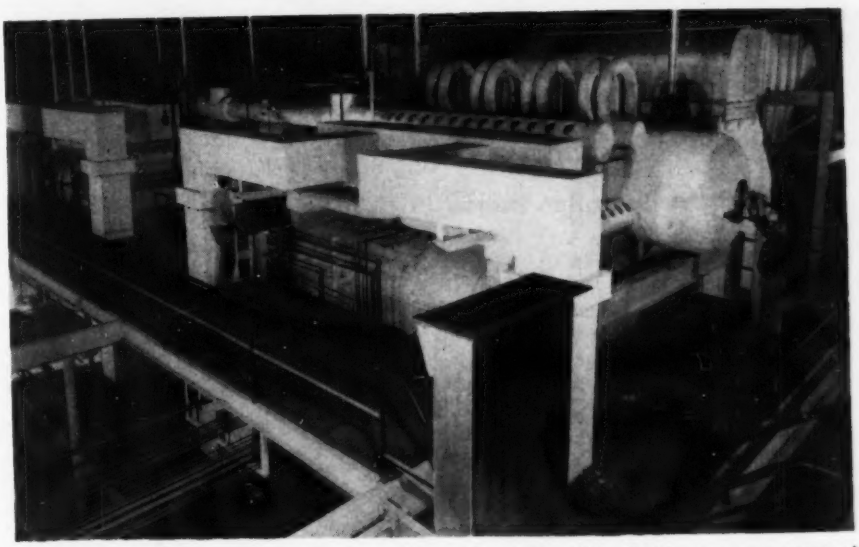
Opinion in the industry seems to be that for special situations, the new process is attractive. What makes it attractive for Weyerhaeuser, some experts think, is that the magnesia mill is integrated with a kraft mill. Since heat recovery in the magnesia process provides most of the required power for its operation, the slab wood and trim previously used as "hogged" fuel can be used as raw material for the kraft mill. But if the kraft mill were not there, they point out, the scrap wood could not be utilized to any extent.

Other pulp plants will very likely discover circumstances under which the new process will best fill the bill, either for new operations or integration into existing ones. To these, patent licenses* will be granted by Babcock & Wilcox, exclusive licensing agent, on terms best adapted to widespread use of the new development.

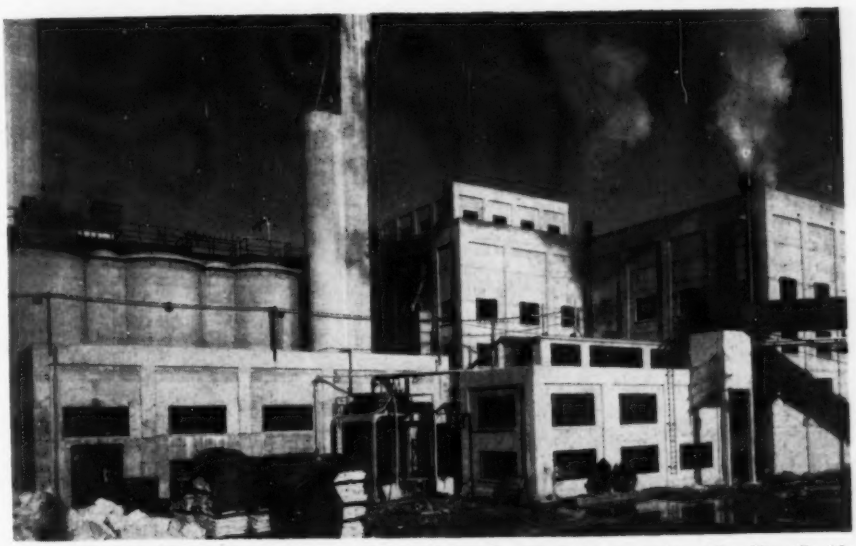
*U. S. Patents 2,179,456 2,192,239 2,238,456 2,285,876 2,308,364 2,320,294 2,351,780 2,354,175 2,377,282 2,385,955 (others pending)



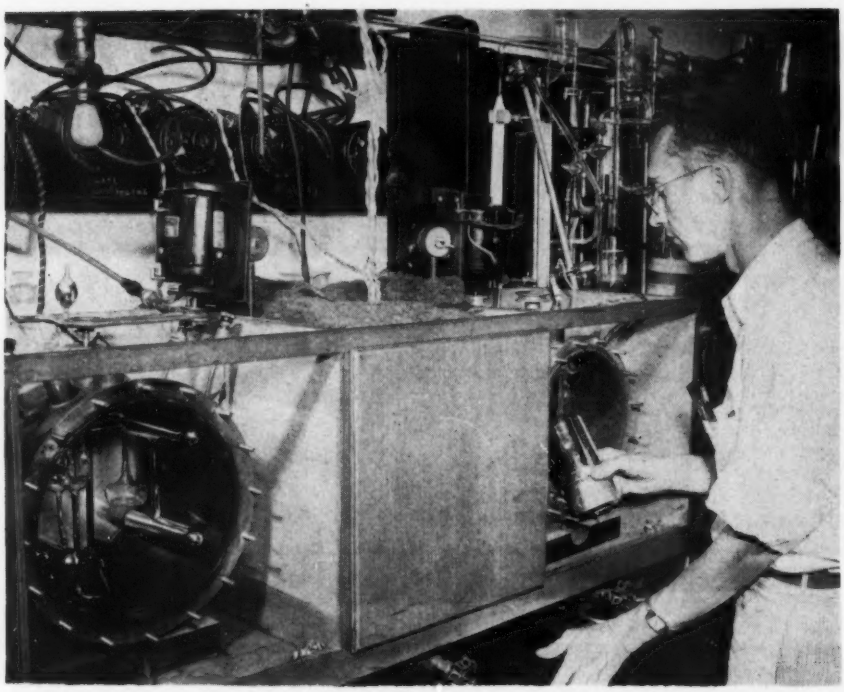
LIQUOR BURNERS: Two batteries of six jet burners use concentrated waste liquor as fuel to fire boilers.



RECOVERY UNIT: Magnesia is recovered as a flue dust, sulfur dioxide as a component of the flue gas.



ABSORPTION TOWERS (at left): The cooled and separated magnesia and sulfur dioxide recombine to form magnesium bisulfite. Power plant is at right.



VAPOR PRESSURE: Standard sample at left, manometer in center, and test sample on right.

0.000001 ATMOSPHERE

Differential manometer detects pressure differences of a millionth-atmosphere.

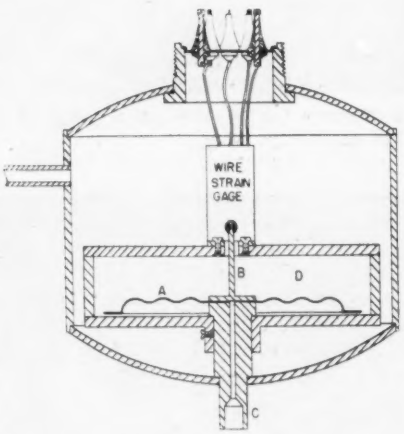
PRESSURE differences as small as one millionth of an atmosphere over a range of total pressure from 1 mm of mercury to 1 atmosphere can be detected by a new differential manometer developed by Harry Matheson and Murray Eden of the National Bureau of Standards. This instrument, which operates on the principle of the aneroid barometer, can be used to compare pressures of gases, organic vapors, and non-corrosive liquids. It is particularly useful in the determination of vapor pressures: less than a drop of liquid is sufficient to compare an unknown vapor pressure as a function of temperature with that of a known liquid. The rest point of the new manometer is insensitive to temperature, and accidental pressure differences as high as one atmosphere introduce only temporary hysteresis effects. The instrument is also readily portable and need not be leveled before operation.

Other Devices Inconvenient

Many devices for measurement of absolute vacuum or pressure differences are available. But the majority of such gages do not operate satisfactorily in the presence of vapors. Other common disadvantages are large dead volume, inconvenience of handling or moving, difficulty or slowness of manipulation, lack of precision, and sensitivity to temperature. Their unsuitability became apparent in a study of high-polymer plastics in solution, when it became necessary to compare solution vapor pressures accurately. The new type of differential manometer was the result.

Does it with Wires

The new instrument measures a pressure difference as the change in the separation of a pair of nesting diaphragms. The



difference is indicated by an unbonded wire-resistance displacement gage. The two diaphragms are soldered together at their edges to form a very thin capsule into which is admitted one of the vapors whose pressure is to be compared. The other vapor surrounds the capsule externally.

One diaphragm is attached to a stationary support through which vapor enters the capsule; the other is connected to the displacement gage. The four resistance wires of the gage are arranged to form a Wheatstone bridge, in which an increased separation of the diaphragms elongates one pair of wires (increasing their electrical resistance by decreasing their diameter) and shortens the other pair (decreasing their resistance). A decrease in the diaphragm spacing has the opposite effect. The resistive unbalance as indicated by a galvanometer gives an accurate measure of the separation of the diaphragms, and thus measures the pressure difference. The capsule and gage are sealed in a vacuum-tight chamber.

Sensitivity Constant

Tests of the new manometer have shown that its sensitivity is not appreciably altered when the active elements are used at temperatures between 20° and 50° C. for values of absolute pressure between 1 mm of mercury and 1 atmosphere. The elements can withstand a differential pressure of 1 atmosphere where the greater pressure is external to the capsule, or a pressure difference of 0.2 atmosphere in the other direction. When used in a balancing system the equality of two pressures may be found to an accuracy of ± 0.001 mm of mercury; the direction and magnitude of a pressure inequality in an unbalanced system may be determined between 0 and ±0.5 mm of mercury. The indicated rest point remains constant within 0.005 mm of mercury for periods of at least one day, even though the device may be subjected during this time to pressure differentials of the order of 0.2 atmosphere and temperature variations of several degrees.

CHEMISTS' UNION

THE ASSOCIATION of Industrial Scientists made news twenty months ago when it was certified as the bargaining agent for professional men with Shell Development Co. It made news again last month when it finally reached agreement with Shell and signed a contract.

The new agreement calls for a 7½ per cent salary increase (the Association asked for 12); the company's right to grant "merit" increases without bargaining; discussion of salary increases by either party at "reasonable" times; and more publications and trips to scientific meetings by the employees.

The Association was formed in 1943 for self-protection against the left-wing Federation of Architects, Engineers, Chemists and Technicians (CIO), which fought to suppress the Association.

The union's theme: "Rewards attained by industrial scientists are not commensurate with their contributions to society."

HARDWOOD RAYON

International Paper Co. will produce rayon-grade kraft pulp from hardwood.

LAST MONTH a Swedish pulp and paper expert was shown some of International Paper Co.'s new rayon-grade dissolving pulp. He—coming from the generally acknowledged "capital" of pulp and paper technology—expressed amazement that rayon pulp could be made from hardwoods.

JOHN H. HINMAN: Profit from skipped trees.

International, too, is keen about its new process, is all set to build a 300-tons-per-day plant as soon as the location (somewhere in the South) is settled upon. All plans and engineering have been completed, and construction is scheduled to be finished early in 1950. Consummation of these plans will mark the first commercial use of straight hardwoods instead of softwoods for rayon manufacture. The proposed plant will add 16 per cent to North American rayon pulp output.

Ate, Not Ite

Significantly, the new process is based on sulfate (kraft) instead of the sulfite traditionally used for making such pulps. The company's research has shown that the kraft process is less expensive, from the standpoint of investment as well as operating cost, and gives better results.

The new project, reports John H. Hinman, International's president, involves radical changes in the sulfate process and novel methods of purification and bleaching. What these changes are, the company is not yet saying. It does say, however, that the new pulp gives yarns of superior strength and more rapid processing by converters, resulting in lower operating cost and a considerable saving in their capital investment.

The new process has been growing up too long to be called an infant. Development started back in 1936 as a cooperative project between two International groups: the Southern Kraft Division, which initiated the process, and Cellulose Research, Ltd., a wholly-owned research affiliate of Canadian International Paper Co. under the direction of Sigmund Wang.

The Canadian group could draw upon the 28-year rayon-pulp experience of Canadian International's mills, and the Southern group was intimately familiar with the kraft process and the utilization of hardwoods therein.

The new pulp has already been made in substantial tonnages for plant-testing by manufacturers of rayon yarn and other cellulose products.

Better Logging

Why hardwood pulping? International's timber lands were bought for the pine stands, but they also include much hardwood. By extending the range of usable woods, the company can log more completely and efficiently, and turn to a profit the hardwood trees that were formerly skipped. The mill will also provide a ready market for hardwood on farmers' lands in the vicinity.

Important to the nation, too, from the long-range point of view, is the fact that more extensive use of different types of woods can contribute to better forest management and conservation practices.

BOVINE DELICACY

Urea can replace a large portion of the protein supplement in the feeding of cattle and sheep.

ONE HAS only to take a trip to the meat market to be convinced that protein-rich materials are expensive. Furthermore, they are relatively as costly to the livestock feeder. Today Du Pont, with its "Two-Sixty-Two" feed supplement, has made it possible for those animals with four stomachs—ruminants such as sheep and cattle—to utilize synthetic urea, prepared from coal, as a protein supplement. Animals with a single stomach, like the new car purchaser without a "tip," need not apply.

Ambulatory Fermentation Vat

Urea is not a protein but its nitrogen content is converted to protein in the first stomach (or rumen) by the action of the living organisms which are always present. In effect, the rumen is a miniature fermentation vat wherein urea is converted to the desired protein. For a number of years Anheuser-Busch has made and sold a high-protein feed supplement obtained by the action of microorganisms such as yeast on a mixture of simple nitrogenous materials and carbohydrates.

Success of the urea supplement seems to be established. More than 2,000,000 tons of feed containing this supplement have already been swallowed by the nation's cattle and sheep.

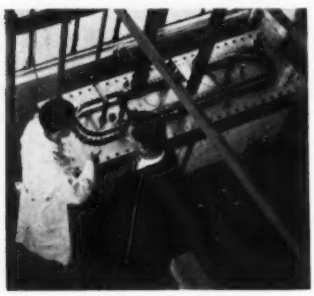
FEEDING TIME: "Coal" for a balanced diet.

A CI REPORT ON

FLUORINE IN INDUSTRY

Part 1: Economic Aspects of Fluorspar

by N. T. HAMRICK* and W. H. VOSKUIL**



DEVELOPMENTS OF THE LAST FEW YEARS have put fluorine on the threshold of a wider industrial significance than it has heretofore enjoyed. The promise of expansion has focused attention on fluorspar and other fluorine sources; and it seems clear that the realization of that promise depends on our husbanding of fluorspar reserves, utilization of ore up-grading methods, and greater dependence on imports. The need for further research is indicated, too, for the utilization of the virtually untapped fluorine in rock phosphate and other less familiar ores.

FLUORSPAR has become a major raw material for the chemical industry. It is also being used in increasing quantities in the steel, aluminum, glass, enamel and other process industries. Elemental fluorine and hydrofluoric acid, derived from fluorspar, are playing an increasingly important role in the manufacture of numerous fluorine compounds of great industrial importance.

Simultaneously with the rapid decrease of reserves of high-grade domestic fluorspar has come this enormously increased demand for a high purity product for the chemical industry.

This has resulted in two things: (1) an increased effort to improve methods of beneficiation and (2) an increased interest in research to provide an alternate source of fluorine.

Fluorspar (more properly known as fluorite) is the most important source of fluorine today. It is calcium fluoride (CaF_2) which in pure form contains 48.7 percent fluorine and 51.3 percent calcium.

Since the early war years, fluorspar has become one of our most critical, nonmetallic minerals. This resulted from the demand for greatly increased tonnages in the steel industry, in the production of synthetic cryolite for the aluminum industry, and in the production of hydrofluoric acid, a large percentage of which was used during the war as a catalyst for the production of high-octane gasoline and in Freon, used as a solvent and propellant for insecticides.

This, in conjunction with an upward price trend, has given added impetus to better methods of beneficiation in order to recover a larger percentage of calcium fluoride from the ore.

For many years the United States has been the world's largest producer of fluorspar with the result that the early lush days of surface mining are over and production costs have risen sharply. In the face of continuing unprecedented demands, we must face this situation of rapid depletion of reserves with a determination to find new sources of supply, better methods of beneficiation, and maintain a national policy of tariffs that will permit importation of ample quantities of foreign spar and at the same time safeguard domestic producers.

PRODUCTION

Mining and marketing of fluorspar did not begin until the early 1870s, and even then on a very limited scale. Chief uses were in making hydrofluoric acid and in the manufacture of opalescent glass and enamels, only small quantities being required for any of these purposes. In 1888 the basic open-hearth process for the manufacture of steel was introduced into the United States and the fluorspar industry was launched on an era of rapid expansion.

Up to that point fluorspar had had a long but relatively unimportant career. Medieval iron and steel makers had probably used fluorspar as a fluxing agent without realizing it, since fluorspar is frequently found with limestone, which was then used as a fluxing agent. Long before Columbus came to America, the Mound Builders were using fluorspar as their most precious jewel.

STEEL LARGE USER

Our records dating back to 1880 show that during the period from 1880 to 1888, when the open-hearth process was introduced, production had not exceeded 6,000 tons per year and the price had ranged from $4.00 to $5.00 per ton. By 1902 production had reached nearly 50,000 and the price had increased to $5.66. Continued low prices during these early years stifled the incentive to produce beyond immediate demand. Lack of good transportation and high freight rates did much to localize consumption in a fairly limited area. Since much of the country's steel production was centered around Chicago and Pittsburgh, the Illinois-Kentucky area had

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the decided advantage of a relatively short rail haul to Chicago and of barging facilities to the Pittsburgh area. There was no reported production outside of Illinois and Kentucky until 1902. The Illinois-Kentucky area had produced more than three-fourths of our national supply to date.

From then on the demand increased rapidly, so that by the close of the first World War in 1918 production had reached almost 264,000 tons (Figure 2) and the price had skyrocketed to $20.72. After a brief retrenchment following the war, the market recovered and remained fairly constant until the early 1930s when the depression brought about a general curtailment of mineral production.

By 1932 production had fallen to approximately 25,000 tons and the price to $15.54 per ton. From that point on there was a steady increase (except in 1938) until 1944, when production reached a peak of almost 414,000 tons with a price of $30.22 per ton. Had it not been for price ceilings, the price would doubtless have been considerably above that figure.

Although the immediate postwar years showed a characteristic decrease in both production and consumption, the price has continued to increase steadily until it has reached the highest point in recorded history (Figure 2).

Looking for a few moments at world production, we find (Figure 1) that during World War I the United States was producing around 70% of the total world production. That percentage has decreased to approximately one-third of the total production today, due not to decreased U. S. production, but rather to increased production and increased industrial development in other countries. As our supplies decrease and it becomes more necessary to look to foreign sources —or to some new source of fluorine—the foreign situation becomes of vital interest to our own economic structure.

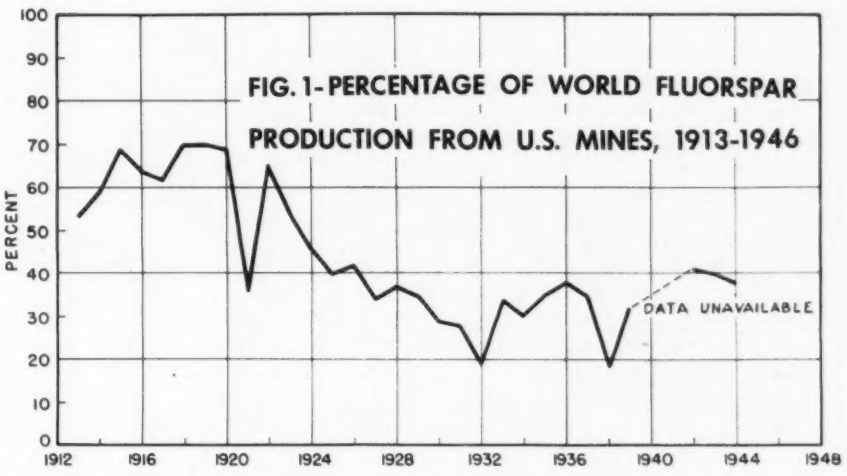
Figure 2 shows that U. S. production has followed the price curve rather closely except during World War II when price ceilings restricted prices during a period of unprecedented demands. Production declined rather sharply in the final months of 1945 during the adjustment to peacetime activities but has since shown a surprisingly rapid resumption to near wartime levels.

IMPORTS, EXPORTS, TARIFFS

Exports of fluorspar, from the country, except for a brief period, have been negligible. Consumption has consistently exceeded domestic output and production costs here have remained above those in foreign countries—both factors in curtailing exports.

Just prior to World War II, the U. S. was taking pride in the fact that she had become virtually independent of imported spar. The rapid expansion of wartime demands, however, found the government encouraging Mexico to develop large deposits, with the result that large quantities were brought into the U. S. for processing into high-grade spar for military purposes. With the continued high demand for fluorspar since the war it is not likely that imports will again be discouraged.

Since 1928 we have had a rather peculiar and interesting tariff provision: Imports were divided according to CaF_2 content, the rate for fluorspar containing not more than 93 percent CaF_2 being $2.50 per ton more than that on fluorspar containing more than 93 percent CaF_2. In 1930 the percent of CaF_2 was changed from 93 to 97 percent. This was done to protect domestic producers of metallurgical grade spar and to encourage imports of high-grade spar.

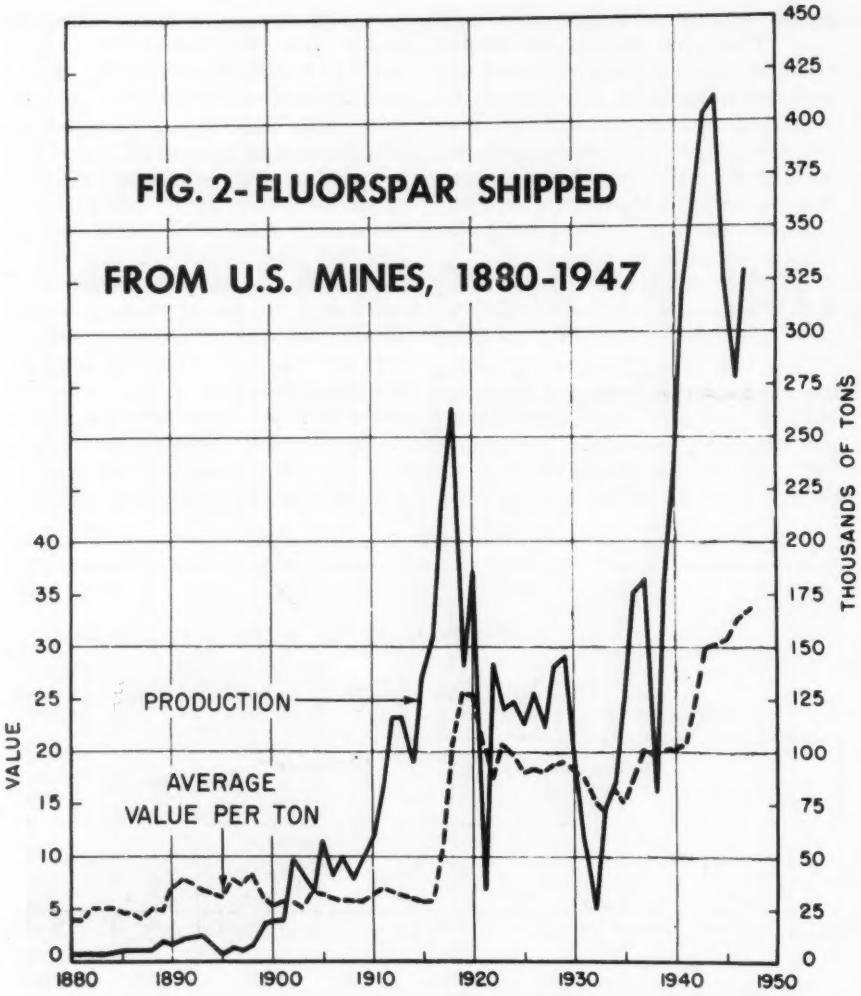


The question of tariffs is of prime importance at this time since it is becoming increasingly vital to the fluorspar industry that our imports be maintained at a relatively high level.

The trend today in general seems to be toward a pronounced reduction of present tariff barriers. This presents a problem worthy of careful consideration in our diminishing mineral industries in view of the various factors involved. Nationally it is imperative that we maintain a sufficient supply to guarantee, as much as is possible, against an emergency. What such a supply would be cannot accurately be foreseen. Nor can the capacity of our own industry to expand under emergency conditions be known beforehand. Production costs in this country are, and are likely to remain, considerably above those in foreign countries. As our domestic supplies decrease it becomes increasingly important to make sure that our tariff regulations are sufficiently high to protect our own industry with its increasing costs of mining and beneficiation, yet at the same time sufficiently low to insure adequate imports. It has been suggested that the government import heavily for stockpile purposes, or remove the tariff and buy foreign spar at a world price, paying domestic producers a subsidy for their higher production costs. The consumer using domestic spar would then be given the advantage of buying his spar at the world price. This course of action does not seem unlikely in view of the international political and economic situation, with the United States gradually assuming the status of a creditor nation. Without some such arrangement the removal or reduction of existing tariffs would seriously injure the competitive position of the domestic producer. Those who fear the extension of any government controls, and the use of subsidies, oppose any lifting of tariff barriers and believe that as domestic production costs increase protective tariffs should be maintained to keep prices in line with increasing costs here, or outline a plan of long-range reduction whereby both producers and consumers could plan their programs accordingly. Whatever tariff program is needed to assure the nation of a fully adequate supply with what appears to be a sufficient margin for emergency is vitally important to our country today. In conjunction with this a program of research for new or extended deposits, conservation of existing supplies and plans for an increased program of imports is definitely in order as our known domestic reserves become insufficient.

ORE BENEFICIATION

The Illinois-Kentucky area has long been famous throughout the world for its continued high production of fluorspar. Reserves have seemed so sufficiently adequate that little serious attention was given to them until the period of unusual demand during World War II, and particularly since the demand appears destined to remain far above prewar levels.



Recently, then, considerable attention has been given to a more accurate determination of reserves, to better means of beneficiation in order to increase the percentage of recovery, to the problems of concentrating some of the more complex ores of the West and Southwest, and to a more economical means of recovering ores from the Illinois-Kentucky area.

Heavy media processes have played an important part in increasing the percent of recovery. Pulps of high specific gravity are produced by the suspension of a heavy magnetic mineral such as ferrosilicon or magnetite in water. Minerals lighter than the suspension will float and any heavier than the suspension will sink.

Preconcentration has been found to increase the extractions of ore and to decrease the overall cost of producing flotation concentrates. Frequently a mineral deposit cannot be beneficiated economically without the combination of heavy media preconcentration followed by froth flotation.[2]

During recent years the Bureau of Mines has given much attention to means of increasing our supply of strategic and critical minerals. In connection with this effort several tests were made at the Rolla Division, Metallurgical Branch of the Bureau of Mines at Rolla, Mo.,[15] to determine the feasibility of producing acid-grade spar from southern Illinois ores and to determine means for more complete recovery of the CaF_2 content.

The flotation process was developed in 1920 and has opened up new possibilities in the beneficiation of low-grade ores that have enabled operators to frequently obtain as high as 98 percent merchantable fluorides.

Southern Illinois fluorspar producers were the first to use a flotation process for the removal of both metallics and non-metallics in a continuous process. This unique process is important both technically and economically. Some of the Illinois-Kentucky fluorspar contains zinc and no lead (as that noted in the Bureau of Mines tests); some contains lead and no zinc; while still other contains both. In the flotation process for that containing both lead and zinc, the zinc is removed first, then the lead, and then the calcium fluoride.

Western fluorspar contains little lead and zinc with considerable quartz and a higher silica content. Removal of the quartz presents a different and more difficult problem than the separation of the lead and zinc concentrates.

CONSUMPTION

Since shortly after the basic open-hearth process for the manufacture of steel was introduced into the United States in 1888 the fluorspar industry has depended upon the steel industry as its chief consumer. Although the percentage of fluorspar per ton of steel has gradually been reduced to an average of about 5.4 pounds per ton of steel and the percent of total fluorspar consumption used in steel manufacture has dropped from over 80 percent in the 1920s to about 50 percent at present, yet the total quantity used by the steel industry today shows a definite increase over prewar consumption. With the rapid increase in the demand for fluorspar in the manufacture of hydrofluoric acid, it is uncertain whether or not steel will long continue the lead in consumption which it has maintained to date (Figure 3).

A history of the fluorspar consumption, both domestic and foreign, by industries, is presented graphically for the period since 1925 in Figure 3. This shows the marked increase in the consumption of fluorspar for the manufacture of hydrofluoric acid during World War II. It is noteworthy that the postwar months of 1945 showed a sudden drop in consumption for this purpose almost immediately following the close of the war, as the use of hydrofluoric acid shifted from almost entirely military purposes to a resumption of civilian needs. By January, 1946, however, the tide had turned and since that time there has been a surprisingly rapid increase in the rate of consumption for this purpose.

Because of the establishment during the war years of so many new uses for fluorspar, as well as the growth of so many old uses for it, there seems little reason to believe that the annual demand will again fall much below 300,000 tons.[17] This figure was based on an estimated consumption of 128,000-152,000 tons by the basic open-hearth steel furnaces and foundries, 25,000-35,000 tons by the ceramic industries, 25,000-38,000 tons by the aluminum-magnesium industries, and 75,000-90,000 tons by the chemical industries. Actual consumption figures show that the demand since the war has even exceeded these estimates, although ultimate consumption may level off at a slightly lower average. Curtailed production of civilian goods during the war naturally resulted in a backlog of needs that has kept production in most industries at a peak up to the present time.

The chief commercial grades of fluorspar are acid, ceramic, and metallurgical, containing 98, 95 and 85 percent CaF_2, respectively. Improved technol-

ogy in beneficiation has enabled producers to not only recover a much larger percentage of CaF_2 from the crude ores than formerly, but also to control the output by grades according to the current demands, to make economic use of low-grade ores formerly considered impractical to mine, and to recover high-grade concentrates from discarded tailings at the mines.

THREE GRADES

Metallurgical Grade—Metallurgical spar is largely used by the metal industries because of the desirable fluxing qualities of fluorspar. Although certain substitutes for fluorspar—calcium silicate, ilmenite, borates, etc.—have been tried, none has proved as successful as fluorspar. Most of these substitutes are less expensive than fluorspar and may possibly serve as an economic price ceiling on metallurgical spar. Nevertheless, while the quantities of spar needed by the steel industry remain such a small part of the total cost of production, it would take a considerable increase in the price of fluorspar to make it an important economic factor in the price of steel. Fluorspar used in the steel industry today does not average above 6-10 cents per ton of steel. The chief value of fluorspar lies in increasing the fluidity of the slag and in eliminating sulphur and certain impurities by volatilization.

The ability to market a pelletized product from the concentration process of making acid-grade spar has made possible the use of second-grade tailings that formerly had no market. The pelletized product has as yet not found favor with the entire steel industry although it has been used with very good success by several companies.

Ceramic Grade—The glass industry is consuming ten times as much spar as it did ten years ago. Much of this expansion has come in the field of non-transparent glass using fluorspar as an opacifying agent.

Fluorspar is used in the manufacture of opal, opaque, and colored glass to be used in such finished commodities as lamp globes, bulbs, soda fountains, containers for food, toilet, and medicinal preparations, and lavatory fixtures. From 50 to 500 pounds of fluorspar are used per 1000 pounds of sand in the manufacture of glass, depending upon the type of product desired. Substitutes for fluorspar have been tried but offer little competition either because of higher cost or lower efficiency. A more finely ground fluorspar (60 percent through a 100-mesh screen) is required for the manufacture of vitreous enamel than for opaque or colored glass (55 percent through 100-mesh screen). These commodities include sinks, bathtubs, stove parts, refrigerators, toilet fixtures, etc., where vitreous enamel coatings are applied to iron or steel. Similar coatings are also applied to pottery, brick, and tile. Enameled sheets for store fronts and filling stations, and as a substitute for tile in bathrooms are proving popular. Since civilian consumption of such products was so drastically curtailed during the war, the market for this mineral for enameling purposes showed a marked upward trend as soon as civilian manufacture of these commodities was again possible.

Acid Grade—Since the temporary decline in demand for fluorspar for the production of hydrofluoric acid at the close of World War II, there has been a striking increase in demand as the chemical industry adjusted to peacetime uses. Production of hydrofluoric acid (anhydrous and technical, calculated at 100% HF) in June 1948 was 3,089 tons or an increase of 34 percent over production in June 1947. Likewise production for the first six months of 1948 (15,699 tons) was a 22 percent increase over the same months of 1947.

During the past decade new uses for hydrofluoric acid have been developing so rapidly that it is altogether possible that eventually more fluorspar will be required for its manufacture than is normally used in the manufacture of open-hearth steel.

Although fluorine chemistry has been slow in getting a start, because of the technical difficulties involved, it has become a significant factor in the field of science both from its theoretical importance and commercial application, as will be shown in Part II of this report.

U. S. RESERVES

The problem of reserves is one which must be approached cautiously, being ever mindful that the most painstaking estimates may in time be proved erroneous. The fact that fluorspar occurs in relatively small veins makes it more likely that new deposits will be discovered and at the same time more difficult to ascertain with any degree of certainty the real extent of the known deposits without expending far more labor and capital than has usually been deemed expedient in the past.

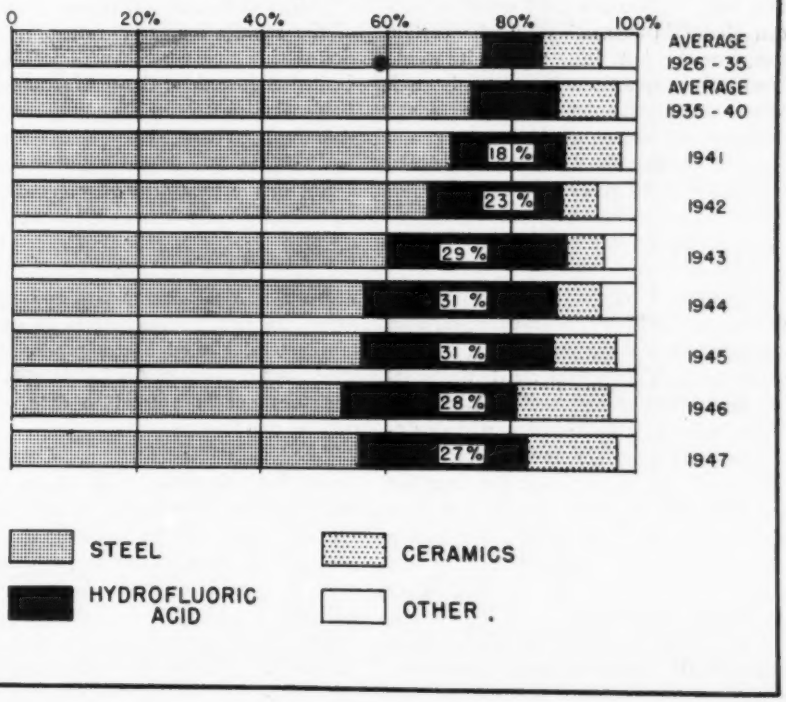
Numerous factors listed below must be considered in determining the life span of a given deposit even when its extent is known with a relative degree of certainty:

(1) The frequent presence of water in the mines—particularly in the Illinois-Kentucky area along the Ohio River—makes uncertain the extent to which even a known deposit will be economically available.

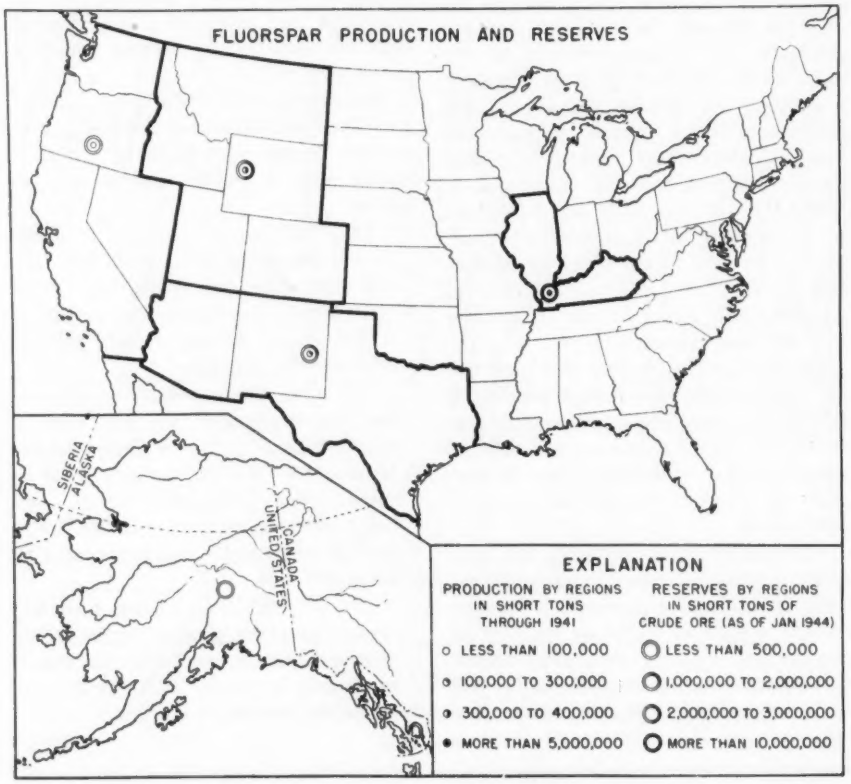
(2) After the first lush days of mining have exhausted the ore that is readily available, it is necessary to determine the ratio of mounting costs in mining less accessible, deeper, and more widely scattered ore bodies to the type of ore available, market value, and demand.

(3) Not only will mining costs increase with the gradual depletion of reserves, but beneficiation of lower grade ores is usually necessary at considerable expense.

FIG. 3- CONSUMPTION OF FLUORSPAR BY INDUSTRIES, 1926-1947



Granting then that as ore reserves near depletion relative costs of merchantable concentrates will mount appreciably, will the demand be sufficient to keep prices at a level to warrant this additional expenditure? At present this problem does not seem to enter the picture. Prices never have been so high before and, except for a brief period during World War II, the demand never has been so great. To what extent this condition is due to the general economic level and to what extent it might be affected by a shift in the general price structure is somewhat uncertain today. Should a shift occur, a sudden slump in demand would be certain temporarily; but just where it would level off is questionable—certainly well above the prewar level because of the multitude of new uses of fluorspar and fluorine compounds that have developed within the past five or six years.



United States Department of the Interior Geological Survey and Bureau of Mines.

HARD TO ESTIMATE

The map of reserves included (above) represents crude ore reserves. Likewise, estimates were made for calcium fluoride content, which show how constantly shifting the picture of reserves is. When another estimate is published it will doubtless contain some changes as startlingly different from this one as it was from the one published in 1934. Nor is it a matter of any of these estimates being hastily or carelessly made but rather that at best estimates must be made on exceedingly incomplete information.

For example, an estimate of 5 million tons (2 million tons for Illinois and 3 million for Kentucky) was given for the Illinois-Kentucky area in 1934.[18] Between 1934 and 1944, when the latest available estimate was made, approximately 2 million tons had been mined out of this area, yet the estimate for 1944 reserves was listed as 6,200,000 tons (100% CaF_2 basis).

Likewise, world reserves in 1934 were estimated to be approximately 9.5 million tons, whereas the 1944 report estimates them to be slightly over 14 million tons, yet during that ten-year interval production had exceeded 3.5 million tons.

This is particularly noteworthy in view of the rapidly increased rate of production during that period and since. In the United States alone the production, 1934-1944, was over 2.5 million tons, whereas the total United States production up to 1934 was less than 3.5 million tons.

But in the face of a very encouraging picture of greatly increased known or indicated reserves is the somewhat alarming factor of a far more rapid rate of demand than had at any time been anticipated. In fact, approximately 50 percent of the total United States production to date has been mined since 1934 (3.4 million tons out of a total to date of 6.9 million tons).

Faced with this situation and the continued high demands, it is to be hoped that a survey of probable reserves in the United States will be made in the very near future. Because of the apprehension over the continued high demand, these estimates are likely to be somewhat more accurate than those of the past. We have reached a point where it is imperative that we know what we face for the future.

TWENTY-YEAR SUPPLY

The present estimate as of January, 1944, gave a total of slightly over 9 million tons CaF_2 for the United States as a whole. If we deduct production since that date (approximately 1½ million tons) we arrive at an estimate for today of approximately 7½ million tons. Until another survey is made this estimate must suffice as the latest attempt to determine our reserves and as the best information at hand on which to base our calculations for the future.

From these estimates it was predicted that at the 1935-1939 level of production (around 175,000 tons per year), domestic reserves might be equivalent to a forty-year supply, or at the war-time rate (around 400,000 tons per year) be equivalent to a twenty-year supply. This, however, did not take into consideration the declining rate of production that accompanies depletion of any ore deposit. On the other hand there is the possibility always of discovering new deposits that would help to balance the picture of declining reserves or perhaps even lengthen the estimates given. The very nature of fluorspar deposits makes this a greater probability than with many types of minerals and increases the difficulty of making a reasonably accurate estimate.

The fact that the postwar demand has not and is not likely to drop much below the wartime level has made the question of reserves one of strategic importance today.

STOCK-PILE?

Those who are charged with the responsibility of providing a stockpile reserve of strategic minerals are particularly alarmed at our situation today with respect to these minerals. What the government is doing toward stockpiling of fluorspar is not generally known, but some of those in a position to know fear the results should a national emergency arise. No one, with the possible exception of the producers themselves, can know with much certainty how near depletion we really are or what their capacity for rapid expansion would be should the need arise.

Those opposing government stockpiling do so on the grounds that it is likely to upset the price structure by throwing quantities of spar on the market at a time when relatively high prices are imperative to domestic production. This is probably an overly conservative view when we consider the low domestic reserves and the probability of foreign supplies being cut off in case of war.

Many believe that with the increasing demand for acid- and ceramic-grade spar, our entire domestic spar supply—except the metallurgical marketed as a second-

ary product in the processing of high-grade spars—should be reserved for chemical and ceramic use, and our imports should be increased to take care of metallurgical spar for the steel industry.

Without some system of stockpiling it seems unlikely that, were foreign markets suddenly closed to us, we could increase our production fast enough and far enough to supply the demand. In view of the uncertain world situation today government stockpiling seems not only wise but imperative. Fluorspar stockpiles do not deteriorate. Therefore the danger of a surplus being thrown on the market at an inopportune time for producers seems far less alarming than the danger of a national emergency arising with no means either of being able to supply the demand for fluorspar or of finding an adequate substitute quickly enough to assure adequate production of steel, aluminum and chemicals. With the rapidly increasing demands for acid-grade spar in the chemical industry alone, it would seem a wise move to reserve our domestic supply for processing to acid or ceramic grade.

CHIEF COMMERCIAL GRADES OF FLUORSPAR[1]

General Classification	*Industrial Use*	*Form*	*Specifications, Per Cent* CaF_2 (*Minimum*)	SiO_2 (*Maximum*)	Fe_2O_3 (*Maximum*)
Metallurgical	Basic open-hearth steel	Washed gravel, less than 1 inch (Not over 15 per cent fines)	85	5	....
Ceramic	Glass and enamel	Ground: coarse, fine and extra fine	95	2.5	0.12
Chemical	Hydrofluoric acid and its products	Lump gravel and fines	98	1	....

[1] *Mining and Metallurgy*, June, 1945.

FOREIGN RESERVES

Because of the heavy drain upon our domestic reserves and the probability that it will not decrease, it is pertinent that we note where our imports may originate and what volume we might expect to obtain under normal conditions or in an emergency.

Recent estimates are not available and, as with our own reserves, we must bear in mind the uncertainty involved in making these estimates and that at best they are based on indefinite and intangible information.

Mexico, from whom we have been receiving the bulk of our imports for the past several years has a potential production far in excess of her domestic demands at present. Mexico has many deposits, including the famous Azal mine, and because of her proximity is our most important prospect for future as well as present imports.

For several years considerable spar has been imported from Newfoundland which has similar advantages. Newfoundland has extensive deposits which appear to be ample for domestic needs and has a sizable surplus of both acid and metallurgical spar for export.

No extensive reserves in Canada are known, although there has been production from time to time. Some Canadian spar has been imported, but our exports to Canada exceed our imports.

Spain probably has the largest reserves of any European country. These are estimated to be at least 5,000,000 tons. Next to Mexico, Spain has furnished our largest source of imports for the past several years. Spain has many mines, of which the Berta is the most important. It appears that Spain will have relatively large tonnages for export for several years.

England reestablished numerous mines during the war which will probably continue to produce more than domestic needs require. English reserves are among the larger European sources.

France has extensive deposits which will be adequate to supply the demand of her steel and aluminum industries, but leave little for export.

German reserves have been relatively large. Although there was considerable exploitation during the war, it is estimated that Bavarian deposits can supply at least 60,000 to 100,000 tons per year for fifty years on a conservative estimate.

Switzerland and Italy have reserves that allow some production for export but are not thought to be extensive.

Russia probably has large reserves but will likely produce for domestic consumption only.

Reserves of South Africa are not large, although they are of a very high quality, and are practically all mined for export. If the South African steel industry can be developed as they hope, there probably will be little surplus fluorspar for export.

Future imports will depend largely upon our tariff and general price structure. Under peacetime conditions with a favorable tariff and a price structure that will encourage domestic production and at the same time foster a program of increasingly large imports of fluorspar, our country should be able to supply an annual demand of present day level for at least fifteen to twenty years. Within that period undoubtedly new deposits or additional extensions to known deposits will be found and also improved methods of beneficiation of low grade ores. Much has been done along this line but we are not willing to admit we have reached the point beyond which no improvement can be made.

ALTERNATE FLUORINE SOURCES

In addition to arousing interest in foreign reserves, the continued high demand for fluorspar and fluorine has made us aware of the need for finding an alternate source of available fluorine to at least supplement the declining reserves of fluorspar.

To date there is no substitute for fluorspar in the manufacture of either hydrofluoric acid or synthetic cryolite, nor is any substitute as effective as a flux in the steel industry. There are, however, other sources of fluorine which may come into importance in the future.

Cryolite—Cryolite, which is sodium aluminum fluoride (Na_3AlF_6), contains 54.4 percent fluorine. This means that a ton of cryolite technically contains 1,088 pounds of fluorine, whereas a ton of fluorspar technically contains only 974 pounds of fluorine. Nevertheless, due to the depletion of the cryolite reserves, we cannot consider cryolite among the possible sources of fluorine as a substitute for fluorspar.

The only known commercial deposit of cryolite is the Danish owned quarry at Ivigtut, Greenland. Imports have dropped rapidly since the war due partially to the fact that artificial cryolite (made from HF) is replacing natural cryolite in many cases. The chief use for cryolite is in the reduction of aluminum, although small quantities are used in glass, enamels, abrasives, and insecticides. The rapid expansion of the aluminum industry since the early 1940s has made necessary the use of large amounts of cryolite. Fortunately, natural cryolite can be replaced with artificial cryolite after the process is started. Every pound of metallic aluminum produced requires 0.1 lb. of cryolite (54.4 percent fluorine). The 1943 production of aluminum, amounting to approximately 920,000 tons, dropped to less than 600,000 tons in 1947. This meant a drop in cryolite consumption from about 92,000 tons to less than 60,000 tons. Had this all been artificial cryolite it would have meant a fluorspar consumption in itself of at least 108,500 tons in 1943 and 71,000 tons in 1947. Thus as cryolite reserves become depleted the strain upon fluorspar reserves increases as it becomes necessary to use more synthetic cryolite.

Rock Phosphate—Rock phosphate may well prove to be the important source of fluorine for the future.

A surprising amount of fluorine can be recovered as a by-product of the phosphate industry. The fluorine content of rock phosphate averages approximately 3 percent, that from Florida running from 3.5 to 4 percent. World reserves are currently estimated to be approximately 28 billion net tons, half of which is in the U. S. Taking 3% of this as the average

(*Turn to page 974*)

A Guide To HUMECTANT Selection

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A NEW CHART based on hygroscopicity determinations on permanent humectants simplifies selection for specialty manufacturers.

SELECTION of materials to maintain the water content of a product under various humidities is an important problem to manufacturers of glues, cellophane water-based inks, photographic film, cosmetic creams, and pharmaceutical ointments, leather finishing oils, paste-type soaps, and other specialties. During the past eight years, the non-availability of certain humectants forced changes in formulation and processes. As expected, many manufacturers immediately returned to their original formulations when the necessary raw materials again became available. In many cases, however, the dreaded change in formulation led to an improved and less expensive product. The result has been a general realization that there is no one or even several ideal humectants. There are many competing humectants, each fulfilling some particular need better than its competitors. A knowledge of the comparative hygroscopicity of various humectants under conditions of varying relative humidity can guide the formulator in his selection. The purpose of this paper is to provide a method of estimating the hygroscopicity of mixtures of these humectants that should eliminate much of the previous trial and error in arriving at the best humectant for a particular job.

COMBINATION OF PROPERTIES

In general, humectants are chosen for a combination of properties such as solvent action, compatibility with other materials, and physiological deportment as well as capacity to absorb and hold water. For a given application several materials may be satisfactory from the standpoint of water absorption but the ultimate choice is made on the basis of other properties. As an example, the softening of paper for the manufacture of draperies may be cited. Satisfactorily soft paper that will drape under ordinary humidity conditions and print well may be made by impregnating a suitable paper stock with polyethylene glycols, N-acetyl ethanolamine, an alkanolamine sulfamate, glycerine, or various sugar and salt solutions. All these materials have been used, but when legislation and public opinion dictated that the draperies must be flameproof, the alkanolamine sulfamates were given a unique advantage. Use of these materials not only equalled competitive products in other respects but also flameproofed the paper to a remarkable degree. These materials have been so well received that many fabricators now agree that regardless of flameproofing action they would be the preferred material.

The data that follow are not intended to be employed as a one-shot selector for the preferred humectant for a given situation but to serve as a guide in selecting groups of humectants that may then be examined more closely for the particular properties required for the applications at hand.

NON-PERMANENT

It is convenient to classify humectants into non-permanent and permanent materials. The non-permaent humectants are used where there is little chance for evaporation or where humectancy is desired for a relatively short period of time. An example of this type is propylene glycol as utilized in cosmetic preparations to prevent drying out during relatively short periods of exposure to the atmosphere. The humectants used in steam-set inks may be of non-permanent type. It is not to be assumed that a permanent humectant cannot be used in these applications, but it is to be remembered that permanency is not essential and may even be undesirable. The non-permanent humectants do not lend themselves to determinations of hygroscopicity data which can be easily interpreted. It is possible to determine the amount of water held by a non-permanent humectant under a given set of humidity conditions. In practice, however, the loss of humectant during exposure to the atmosphere, and the corresponding loss of water held by the humectant, are dependent on the volatility of the humectant. The variations in the volatility of humectants overshadow the differences in their hygroscopicities. For example, though 2-ethylhexanediol-1,3 is less hygroscopic than 2-methylpentanediol-2,4, after identical exposures to the atmosphere the former may hold more water than the latter because of excessive volatilization of the latter. Among the commonly encountered non-permanent humectants, not included in Figures 1 and 2 for the above reasons, are ethylene glycol, propylene glycol, dipropylene glycol, polypropylene glycol 150, and most of the higher molecular weight diols.

PERMANENT

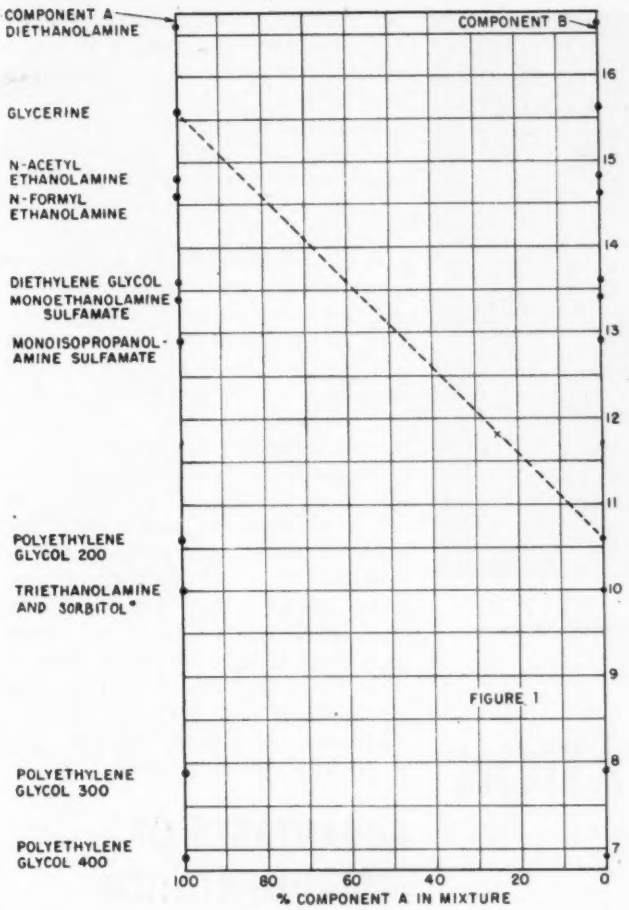
The permanent humectants are readily adapted to measurements of hygroscopicity and these measurements are easily applied in selecting humectants and mixtures of humectants having a given degree of hygroscopicity. These humectants are used as softeners for paper and cork; plasticizers for glue and resin-coated paper; conditioners and sizes for textile fabrics, yarns; anti-static compositions for plastics and yarns and tire bags; for making glassine paper and stamp-pad inks.

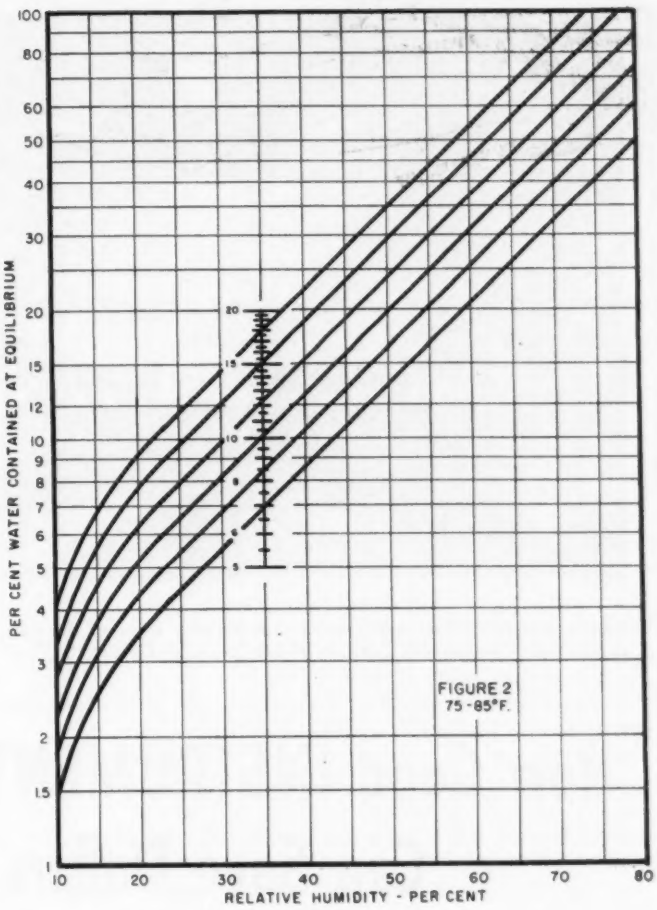
Glycerine was probably the first such material to be employed. Recently materials such as the polyethylene glycols, and the alkanolamine sulfamates, which are much less volatile than glycerine, have been found better suited for certain applications. Already cited is the use of alkanolamine sulfamates as combined softeners and flameproofing agents for paper. As a further example, the polyethylene glycols which are practically non-volatile are particularly suited for softening resin-bonded cork products because they are solvent plasticizers for the resin binder as well as humectants for the cork. The permanent humectants considered in this discussion are:

diethanolamine
glycerine
N-acetyl ethanolamine
N-formyl ethanolamine
diethylene glycol
monoethanolamine sulfamate
monoisopropanolamine sulfamate
polyethylene glycol 200
triethanolamine
sorbitol
polyethylene glycol 300
polyethylene glycol 400

With few exceptions these materials are compatible with glues, starch, dextrin, zein, "Cellosize" hydroxyethyl cellulose, and casein.

In making the determinations upon





* Charts can be used only in the 20 to 80 per cent R.H. range for sorbitol or sorbitol mixtures.

which the accompanying charts are based, a simplification of the method of the Bureau of Standards (J. Research National Bureau of Standards, *14*, 67 (1935) was used on commercial grade humectants in all cases. The per cent water absorbed by the dry weight of each humectant was plotted against time at 10,* 20, 35, 50, 65, and 80 per cent relative humidity. Above 80 per cent R.H. the measurements were difficult to reproduce with the limit of 5 per cent error, but they were easily reproduced in the range of 10 to 80 per cent R.H. The data on these curves were summarized in the accompanying charts.

CHARTS GUIDE SELECTION

From the accompanying figures 1 and 2 it is possible to estimate the hygroscopicity of the humectants listed in the range from 10 per cent to 80 per cent relative humidity. The hygroscopicity of binary mixtures of these humectants may also be estimated in this range. In Figure 1, opposite the name of each humectant, base points are marked on the vertical scales representing both 0 and 100 per cent of component A. The base points are the equilibrium water contents at 35 per cent relative humidity and hence the central scale of Figure 2 is at 35 per cent relative humidity. To estimate the hygroscopicity of a pure humectant, first read the value on the vertical scale. For example, triethanolamine is 10.0 on the vertical scale on Figure 1. The point 10.0 is now located on the central vertical scale of Figure 2. The curve which passes through this point (or a parallel curve if none passes through) represents the change of equilibrium water content of triethanolamine with changing relative humidity.

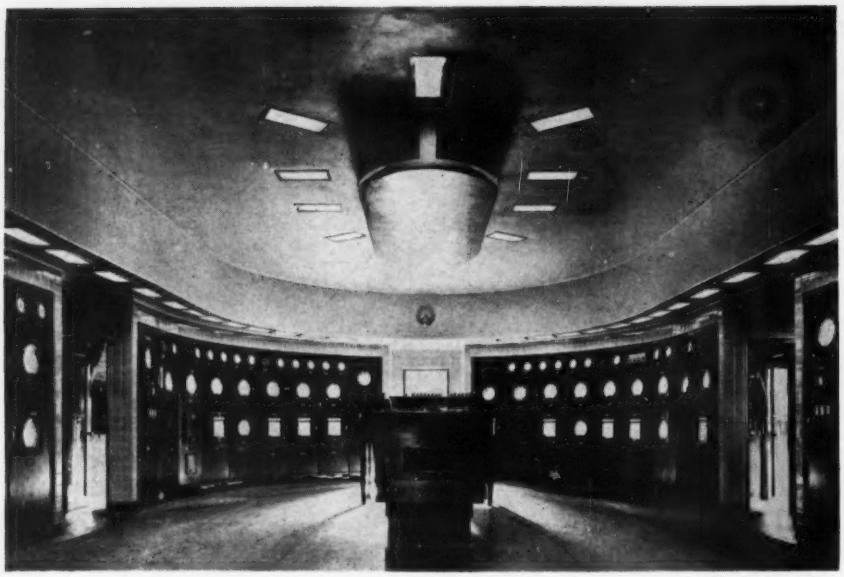
The manufacturer needing a humectant for a paper product where properties other than hygroscopicity are of minor importance can select the most promising material by deciding what relative humidity ranges are likely to be encountered and then estimating what water contents are desirable or allowable at the upper and lower limits of this range. For example, if the exposure is limited to relative humidities of 30 to 70 per cent and water contents of 8 and 50 per cent respectively are needed, Figure 2 shows that humectants around a base point of 10 to 10.5 are required. On Figure 1, these are shown to be triethanolamine, polyethylene glycol 200, or sorbitol.

A formulator of envelope adhesives, however, must also be concerned with compatibility. When dextrin is used, the polyethylene glycols, glycerine, sorbitol and many of the amines are compatible. Assuming it is desirable to have a low water content at high humidities, and a reasonably high water content at low humidities, Figures 1 and 2 indicate that a base point range of 8 to 13 would be the most suitable. Polyethylene glycols 200, 300, and 150 as well as triethanolamine and sorbitol fall within this range. The final selection could then be made on the basis of price, non-toxicity, or other factors.

BINARY MIXTURES

The method for estimating the hygroscopicity of mixtures is illustrated by estimating the hygroscopicity of a mixture containing 75 per cent polyethylene glycol 200 and 25 per cent glycerine. On Figure 1 a line is drawn between the base points for glycerine and polyethylene glycol 200. The point x represents the mixture containing 25 per cent glycerine. This point lies at an elevation of 11.8 on the vertical scale. The point, 11.8, is now located on the central vertical scale of Figure 2 and the curve which passes through this point (or a parallel curve if none passes through) represents the change of equilibrium water content of the above mixture with changing relative humidity. From this and the requirements of his product, the manufacturer will know whether to eliminate or further consider such a mixture as a humectant.

* Except sorbitol, for which only the range 20 to 80 per cent R.H. could be determined satisfactorily by this method.



M. W. Kellogg Co.

Modern process control room for the combination topping, thermal cracking, gas recovery, and alkylation unit of the Continental Oil Co., Lake Charles, La.

How Good INSTRUMENTATION Can Save Dollars

Part 1

by C. S. COMSTOCK*
Monsanto Chemical Company
Texas City, Texas

WITHOUT PROPERLY PLANNED INSTRUMENTATION present large scale continuous operations would be impossible at a reasonable cost.

DURING recent years the typical chemical plant or oil refinery has gradually increased its use of and dependence on automatic instruments to indicate, record, and control process variables. Except in new plant installations introduction of instruments has been gradual, and instrument engineering as such has not entered into the design. As a result instruments generally have served as useful additions and refinements and not as integral parts of the operations.

Addition of instruments to existing processes has not usually been made on any particular sound economic grounds. Some instruments have been added to fill exact needs, such as better control of the quality of product. Some have been added to save labor and some have been added to satisfy the curiosity of engineers. In most cases the over-all economic picture has not been investigated, although such a study is required to obtain maximum benefit from instrumentation. For example, the addition of one instrument will usually not save a man's time but merely ease his job. If more instruments are added, perhaps an operator may be saved. These extra instruments in turn may require an extra instrument mechanic. Perhaps the process should be rearranged to take better advantage of instruments.

Because of the accelerated construction program of World War II, particularly in connection with the aviation gasoline and synthetic rubber programs, a large number of new process plants of tremendous size have been constructed. These plants, in general, have been continuous units of relatively tremendous throughput, and they rely on modern instruments for satisfactory operation. This was a natural development since construction came at a time when instrument manufacturers had developed new and improved measuring and control methods, when manpower for operation was short, and when the products called for quanity production to meet exact specifications.

It is easily seen that the economics of when and how much to instrument both old and new units becomes quite complex. It also seems that it is impossible and also undesirable in a limited space to attempt to draw up anything but general considerations which should govern the instrumentation of a process.

Instrumentation and its relationship to design and operation of chemical plants can be conveniently classified under five general headings: Advantages of Instrumentation; Cost Considerations; Instruments versus Manual Control; Instrument Engineering in Design; and Instrument Engineering in Operation. None of these topics are separate in themselves but are interrelated. Instrument engineering is concerned with the logical and economic interrelations involved.

ADVANTAGES OF INSTRUMENTATION

The primary aim of instrumentation in a process is to produce the best possible product at the lowest possible price. Instruments therefore are used for one or all of the following purposes:

1. To make production possible.
2. To improve product purity and uniformity.
3. To reduce operational hazards.
4. To reduce production costs.

PRODUCTION

It is hard to conceive of any process plant which does not require at least a few instruments. Since practically all process production is specified by physical properties, indicating instruments measuring such physical properties are a minimum requirement. Often with older batch processes a few such devices were the only instruments used. Executives of some of the older chemical companies who were in operations in the "old" days are inclined to think that a real "lily-gilding" job has been done when they see a modern control house with its rows of shiny new instruments.

It must be realized that without instrument control many modern processes would be practically impossible. The change to continuous operation, brought about by economic considerations, has eliminated time as an independent variable. Each step in the process must be exactly correct at all times so that it is no longer possible for the operator to

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* Dr. Comstock was in charge of engineering at Monsanto's styrene plant at Texas City until his death in the disaster of 1947. This article is based on the first portion of a lecture delivered by Dr. Comstock before the First Annual Short Course on Instrumentation for the Process Industries conducted by the Agricultural and Mechanical College of Texas, College Station, Texas.

Part 2, which will appear next month, will discuss Instrument Engineering in Design and in Operation.

correct errors by introducing more time in a certain phase of operation. The alternate to such automatic control would be a man on practically every control valve. Even this, which would be prohibitive economically, would not be an acceptable substitute because a man's attention will wander more frequently than a properly maintained instrument will fail to operate.

PRODUCT PURITY AND UNIFORMITY

One of the most rapidly developing and promising fields of instrumentation is in automatic and continuous analytical instruments. In addition to temperature, specific gravity, vapor pressure, and the more conventional instruments, many new developments utilizing various spectral analyses, refractive indices, electric reaction potentials, and the like are being successfully used and developed. These give a continuous record of product purity instead of spot analytical checks. With continuous production, many thousands of pounds flow to a storage tank in the interval of a usual sampling schedule. Under such an intermittent control system, only then can instruments either correct the condition causing the change in purity or warn the ouerator to do so. However, by knowing the analysis immediately, the disposal of tanks of off-grade material is usually no longer necessary and one of the functions of old time chemical foremen, that of judicious blending, is avoided.

In addition to the actual analytical instruments used on the finished product, the better control of each step, achieved by instrumentation, reduces the possibility of impurities appearing in the final product. Control by instruments in many cases enables greater accuracy than is possible otherwise because the instrument is more sensitive than human perception. A good example is the control of color by spectrophotometry.

SAFETY

One of the costs of running a process plant is the cost of accidents to personnel or the loss entailed by fire or explosion. Even with good fortune, insurance premiums must be paid or an insurance reserve fund maintained.

Instruments which sound an alarm or which correct conditions when they reach predetermined dangerous levels are always a good investment, and greater attention should be paid to them by design engineers. For such purposes there are instruments actuated by excessive temperatures or pressures or by excessive rates of change of other variables. In polymerization reactions, recording instruments and alarms on the power input of stirrers will warn of the increased viscosity resulting when polymerization gets out of hand. Smoke can be detected photoelectrically and dangerous concentrations of some poisonous or inflammable gases can be recorded. Design engineers must become safety conscious and they must realize that a safe plant must be properly equipped with instruments.

A good point to remember is to watch carefully that the instruments fail safely. Accidents can happen to the instruments themselves. If the air line breaks, an air operated valve should either close or open as may be necessary for safety. The same, of course, applies to interruption in the power supply to electrically operated controls.

COST SAVINGS

Management, of course, will approve of any instrument installation which will show a satisfactory return on investment. However, the instrument engineer must prove savings for any proposed installations. Savings can appear in several ways:

1. By reduction in labor.
2. By reduction in capital.
3. By reduction of spoilage or rejected material.
4. By increased production in the same equipment.

1. Labor Savings. Instruments save direct manual labor. This is a measurable saving. In addition, they save by reduction in the indirect expenses which are a function of the number of employees, such as the various personnel services. Against this, labor costs and expenses are introduced: the labor and materials to maintain the instruments, the capital charges for the instrument investment, the charts, air, power, ink and supplies consumed, and probable increased pay rates for the remaining operating personnel to compensate for greater individual responsibilities and the greater skill that may be required. Any operating man will agree that any change in working force toward a smaller number of more intelligent, better-paid workmen is a step in the right direction.

2. Reduction in Capital. Despite the cost of instruments, the total capital investment in a process may be decreased by their application. For instance, Monsanto operates a series of six bubble tray columns to separate the complex mixture obtained in the dehydrogenation of ethyl benzene to styrene. Each tower takes feed from the preceding tower with a minimum of surge capacity—about 3 to 10 minutes. Without control instruments storage tanks would be required between each tower to check product analysis and to supply a uniform feed to the next. The cost of the necessary tanks would be several times that of the instruments.

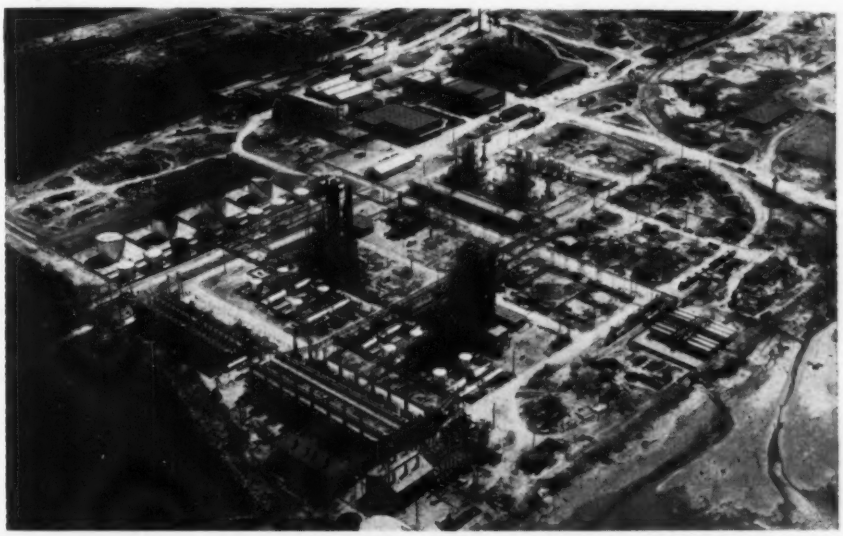
If instrumentation becomes an integral part of design, many such savings can be made. If instruments are like lights on a Christmas tree, added after a process design is all worked out, such savings cannot be realized.

3. Reduction of Spoilage or Rejected Material. It is not possible to analyze here the savings in cost due to reducing off-grade production. This is also a difficult figure to arrive at to justify instrumentation expenses in a new plant. Generally, this is left as a bonus on the benefits. Modern processes operate for many months at a time with assured product purity.

4. Increased Production in the Same Equipment. Uniformity of flow and other variables is necessary for maximum output. If surges are eliminated, it is possible to operate much closer to the ultimate capacity of equipment, and capacity operation is one sure way to lower costs. With confidence in instruments, the design engineer can cut his factor of safety.

COST CONSIDERATIONS

To use cost figures in the subsequent discussion it is necessary to present some



Plants which utilize large scale continuous processing, such as Monsanto's rebuilt styrene plant at Texas City, would be impossible without present-day instrumentation techniques.

averaged figures of costs for operating labor; instrument capital costs; and instrument repair, maintenance, and operation costs.

COST OF OPERATING LABOR

Operator pay is assumed at $1.91 per hour (not far from an average pay rate for a chemical plant operator or an oil refining "Stillman A Helper" in the Texas Gulf Coast area); cost of vacation, holidays, absenteeism, 6.66%; cost of social security, workmans' compensation, pension, 7.3%. Therefore, for a continuous process with one man per shift, the labor cost will be $1.91 x 24 x 365 x 1.1396 = $19,067 per year.

In addition to direct labor charges, there are various overhead charges that are functions of the direct labor. These include such items as safety, sanitation, locker room facilities, and general supervision.

A rough, estimating rule for process evaluation is to calculate plant overhead at approximately equal to 50% of the direct labor plus 2% of the capital. This would add $10,000 to labor, thus making the cost of a man per shift per year about $29,000.

COST OF INSTRUMENTS

Two typical installations will illustrate the determination of instrument capital costs:

1. Flow recording controller operated by transmitter near office flanges—air operated and equipped with seal pots, etc., for 300 pounds pressure:

Transmitter	$ 275
Receiver	360
Installation labor	210
Installation material	330
Control valve	190
Total	$1,365

2. Differential type recording liquid level controller:

Instrument	$ 360
Control valve	190
Installation labor	100
Installation material	169
Total	$ 819

These prices will vary widely with local conditions, with the size of the control valve, and with the actual instruments selected. However, it is safe to say that it will cost at least $1,100 for the average instrument installed.

COST OF INSTRUMENT REPAIRS, MAINTENANCE AND OPERATION

Experience has shown that the total cost of operating a control instrument is about $70 per year:

Repairs and maintenance	$52
Chart changing, statistical analysis, etc.	10
Air and utilities	8
Total	$70

Repair and maintenance items include preventive maintenance, emergency repairs, and necessary calibrations, as well as supervision directly charged to the instrument department.

Therefore, the total yearly cost of a control instrument is:

Depreciation at 10%	$110
Investment return at 20% of gross	220
Operating charges	70
Total	$400

Oak Ridge, largest plant under one roof—the most recording and control instruments as well.

INSTRUMENT vs. MANUAL CONTROL

From the foregoing figures, an interesting comparison can be made.

With the cost of labor $19,000 per year per man per shift and the cost of an instrument $400, the cost of 48 instruments is equal to the cost of one operator per year per shift. When overhead charges are considered, the comparison is still more favorable.

Offhand, it appears likely that the installation of 48 instruments would save an operator's time. The problem, however, is not quite so simple as that. A completely automatic process would leave the operator nothing to do but collect his paycheck, and it should be no trouble to our instrument friends to design an automatic mailing machine or a teleprinter which would write the check in the operator's own home and eliminate even the necessity for coming to work once a week.

However, the desirable minimum number of men in any one operating area is two. One man alone is liable to get in trouble by a simple accident such as a fall. Thus many plants require two men for safety reasons.

Because of the possibility of small leaks and mechanical wear which can be detected by sound, most operating supervisors desire a patrol of operating equipment by the process operator. In many installations, it is possible to operate for an entire shift or longer without leaving the control board. In some cases, it is the practice to leave some manual operations or instruments which must be observed in the field to enforce a regular trip through the apparatus.

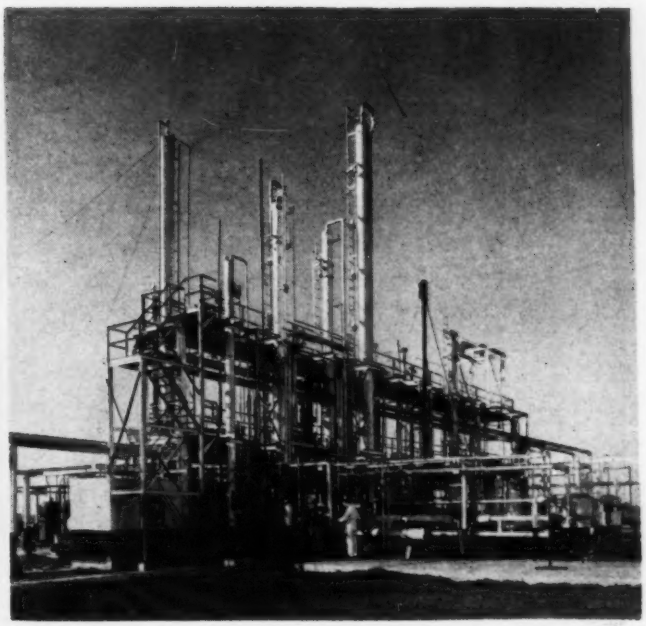
The promise that instruments will save labor is based on three considerations: first, the instrument is rugged and reliable and will function properly as designed; second, the instrument was properly selected and installed to measure and control a significant variable; and third, the instrument is maintained in good condition and is properly calibrated and adjusted.

The first requirement of reliable, well-built instruments is in the hands of the instrument manufacturers. Exceptionally keen competition and the development of modern mechanical and electrical science have resulted in a wide choice of instruments from which the instrument engineer or process design engineer may wish to select.

The second and third requirements of proper selection and maintenance are primarily in the hands of the process designers and the plant operating management, although a great deal of help can be obtained from the instrument manufacturers who maintain sales staffs of engineers well versed in application problems. Manufacturers are also able to supply advice on a proper maintenance program, and also, generally, have factory instructions available for key personnel.

ACKNOWLEDGMENT

Thanks are due to Clyde W. Braswell of Monsanto Chemical Co. for bringing the cost figures up to date.

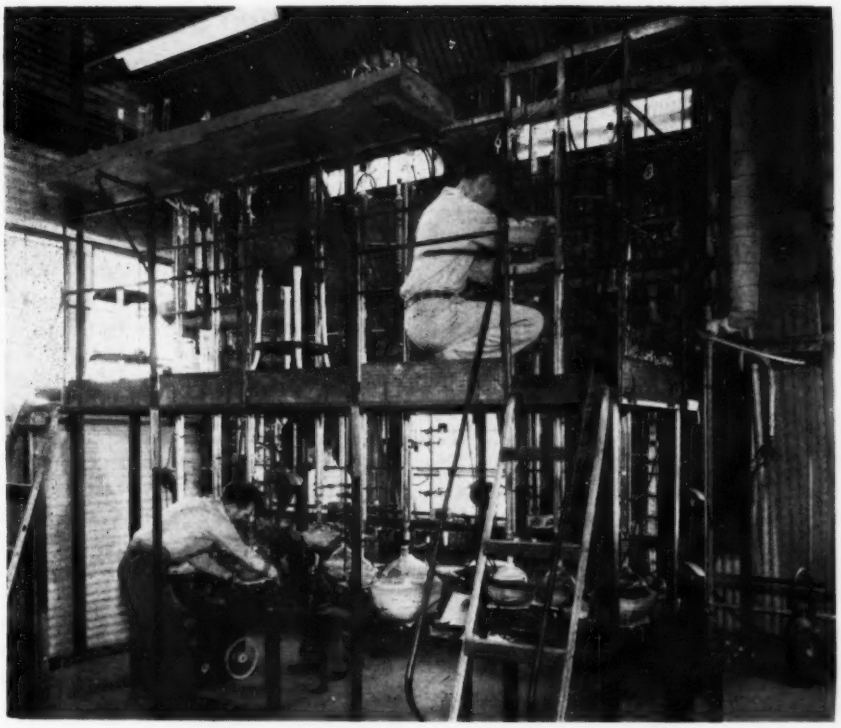


Services—air, steam, water and electricity—are provided in the center section of the permanent steel structure of the pilot plant (right) of the Chemical Division of the Celanese Corp. at Clarkwood, Texas. Several openings for each service, much in the manner provided on the laboratory bench (left), give great flexibility to the operation of the pilot plant.

Plant-Sized Laboratory Bench

EDITORIAL STAFF REPORT

A HIGHLY FLEXIBLE PILOT PLANT features the new research center of the Chemical Division of the Celanese Corp.



Distillation is a major problem in petrochemical research.

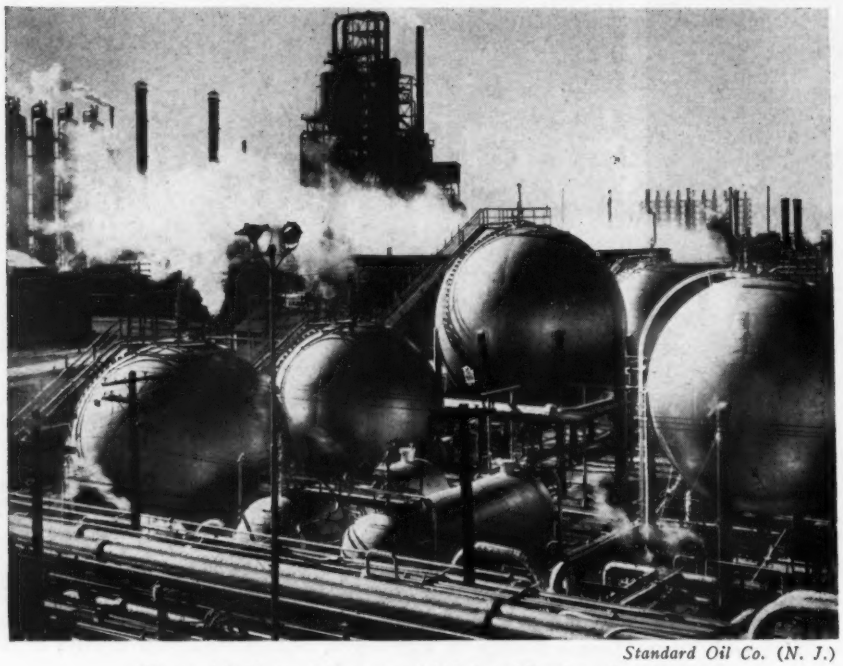
THE Celanese Corp. of America has recently completed a new research and development center for its Chemical Division at Clarkwood, Texas. This new center will house the company's research and development activities on petroleum chemicals and represents an investment of over a million dollars and employment for nearly a hundred people.

The major feature of the center is the unhoused, flexible pilot plant. In many respects the external appearance of the pilot plant is a miniature of the Chemical Division's main plant at nearby Chemcel. On short notice it may be converted into an operation which is practically identical—but on a much smaller scale—with plant type operations.

This flexibility is achieved by the use of a series of open bays on either side of a permanent steel structure which carries the equipment necessary for the experiment. This permanent structure, much akin to the laboratory bench upon which potential processes are born, provides the various services such as air, steam, power, etc., as an integral part of the central structure. Connections to these services are provided at regular intervals to facilitate any change in operation that may be deemed necessary.

The pilot plant unit is set upon a concrete slab, which becomes a trench under the main portion of the permanent steelwork. The pipes and electrical lines carrying the services are set in this trench for easy access and for their protection.

Products now under investigation include a new glycol, 2-methyl 1,3 pentanediol, now being offered in drum quantities, propionaldehyde which is available on a laboratory scale, and penterythritol, which is in the long-range planning category.



Standard Oil Co. (N. J.)

The real business risk starts with industrialization of research.

Putting Research Data to Work

by PAUL D. V. MANNING, Vice-President
International Minerals & Chemical Corp., Chicago

BUILDING A PROFITABLE enterprise from research data is a complex operation requiring cooperative effort by teams of specialists.

IT HAS BEEN estimated recently that during 1948 industrial corporations in the United States will have spent a total of $750,000,000 for research. Industry does not spend this kind of money unless the results can be applied to yield profitable returns. Research, like insurance, guards against certain types of loss. However, no form of insurance will return more than its cost and at the same time prevent the loss from taking place. Research carried out continuously and judiciously is more nearly a guaranteed investment.

A first step is understanding the process of research itself as it exists today. During the past three decades, both the methods of carrying out industrial research and its administration have undergone considerable change. In the early years, the scientist worked in his laboratory with or without a few helpers, mostly following his own desires and interests. Because science was young, the fields of industrial opportunity were fresh and lush. There was not much competition. Results of research frequently grew into enterprises without much risk and effort.

As industry grew, it was quick to recognize the possibility of return on the research dollar investment. Fields became more crowded and in typical American fashion, industrialists began to try to speed up and intensify the entire process of research. This was accomplished by putting teams of specialists to work cooperatively on each problem. Viewed broadly, each research problem today almost always requires the chemist, physicist, biologist, and engineer for the research itself even before industrial exploitation of results begins.

RESEARCH NO RISK

There is little or no risk in spending money on research well done. Since it enhances human knowledge, it always yields results that eventually are useful. A corporation, however, is justified in allocating only a portion of its research budget to that type of basic research which promises no immediate return. At the same time the corporation has an obligation either to carry out or finance some such research constantly — the amount in ratio to the profits it receives from research. This helps keep the reservoirs full.

When the process of "industrializing the results" of research begins, the real business risk starts. At this stage opportunities can be lost easily or business enterprises made. This is always more costly of time, effort and money than the research itself. It is worth repeating that the transformation of the data of a laboratory research to a business enterprise is a difficult and costly risk.

Many factors are involved in turning research results into profits. The essentials are:

1. Good management.
2. A product equal to or better than anything on the market.
3. Either an existing market or one that can be created.
4. Sufficient capital to carry the enterprise during this period.
5. A potential competitive position which can be maintained by a favorable manufacturing cost. If some patent protection can be obtained on the process or product, this is of great help and in some cases essential.
6. Satisfactory sources of raw material.
7. Satisfactory means of production, including both a process and plant.
8. Research and development to maintain and improve the position in the field once it is attained.
9. Satisfactory personnel for the entire enterprise.

Each of these essentials is so important that it is hardly possible to assign a preferred position to any one. The failure or lack of one of these factors will result in the failure of the entire enterprise, either during its development or shortly after it gets underway.

MANY SPECIALISTS

A cursory study of these essentials reveals that many specialists are involved. Just as the research project itself requires a team of experts in different fields of science, putting the results to work requires the coordinated efforts of a greater number with specialized training and experience in many broad fields.

For management, there are needed those skilled in organization, control and administration who must constantly see the whole project and its position as related to the entire business of the corporation. Included in this part of the team are experts in finance and personnel and those who provide capital and legal counsel.

Markets can only be created, developed and maintained by those who are expert in planning and executing sales programs. To carry out this work, advertising is required and this brings in another specialist. Market research goes hand in hand with the work of the sales group on one side and research and development on the other.

Since patents require most careful plan-

From a paper presented as part of the Industrial Research Institute forum held in conjunction with the National Chemical Exposition.

ning, a patent attorney should be employed from the beginning of the research itself.

Another group of experts nurses the project from laboratory to commercial production. This phase includes small and large scale pilot plant work, and building and bringing into operation the producing factory. The cost of building plants is many times greater than it has been in the past. Cost of labor to operate and maintain the plant once it is built is also very much greater. Both factors are so important at the present time that more care, money and time must be put into the development of an enterprise at this stage. This helps hold down the capital needed to build the plant. It also minimizes the time required to bring the plant into satisfactory operation, and finally keeps production costs at the lowest possible level.

Developing and maintaining satisfactory raw material sources may need the work of the geologist, the metallurgist, or other technical man, and it certainly will need the help of the purchasing agent. Throughout all of the program, there is continuous need for that much maligned professional, the cost accountant.

PROGRESS OF AN IDEA

To set up a method to achieve success in putting research results to work, one must go back to the beginning of research itself. All research projects originate as ideas. Preliminary study and laboratory investigation first explore the possibilities of developing the idea into a research project. This may require quite a lot of time. The study involves patent searches and some market research as well. As soon as this exploratory research indicates potentialities, the project, including an appraisal of its chances of success and failure, should be developed into a clear and concise report under the direction of the research administrator. It should be presented so that those who know little about technical matters can easily understand it. Since only projects which show good possibilities will be presented, the importance of making a thorough study and presentation at this point can hardly be exaggerated. In developing the report, simplicity, conciseness, accuracy and even appearance are of utmost importance. This is the first "selling" of the project. Market research data will be included as well as a brief patent survey and, of course, preliminary rough cost estimates to indicate profit possibilities. The report should be distributed to key executives of those departments previously mentioned as being involved in the anticipated successful establishment of the enterprise.

Since any project will require the cooperation of all of these functions before it can become a success, it is best to bring in right at the start those who are to be responsible for the formation of the group that will put the results to work if the research is successful.

The report can best be presented at a meeting of those who are to receive it since this provides opportunity for some preliminary discussion and questions. Following this, reasonable time for study should be allowed. This interval provides each of the departments concerned with time to develop factual information, opinions and comments. These should be given in writing to the research administrator for study.

Final consideration is completed in another meeting of the same group by complete discussion of the project. In this conference a decision can undoubtedly be reached as to whether the project promises sufficient possibilities to warrant further work and expenditure.

PROGRESS REPORTS

Assuming that the decision is to proceed, the progress of the work should be summarized at reasonable intervals and sent to those who have thus far participated. Usually as a research continues, the field becomes broader and new ideas are created. By keeping the members of the entire team advised of the progress, the maximum opportunity for bringing out new ideas is realized. Often this can be made virtually a "chain reaction" resulting in a continuous supply of ideas for further research as well as enlarging the scope of the original project.

If the results continue to indicate a favorable future, preliminary small scale pilot plant work should bring increased participation by the development, engineering, and production groups, and also more activity on the part of the sales group. Production, personnel, engineering, traffic and sales departments begin intensive studies on plant location and allied problems. The sales group increases its activity in developing markets for the product. Engineering begins the design of the plant.

From the start, the hypothetical project has involved a continuously increasing number of people and this poses the biggest problem of the entire project—diverse personalities. No matter how objective, logical, and consistent the plan, personalities will soon enter as its implementation begins. Things are usually simple until human personalities begin to complicate them. The executives in each department must smooth out personality differences among staff members involved in the project. How well they accomplish this is reflected in the success or failure of the enterprise.

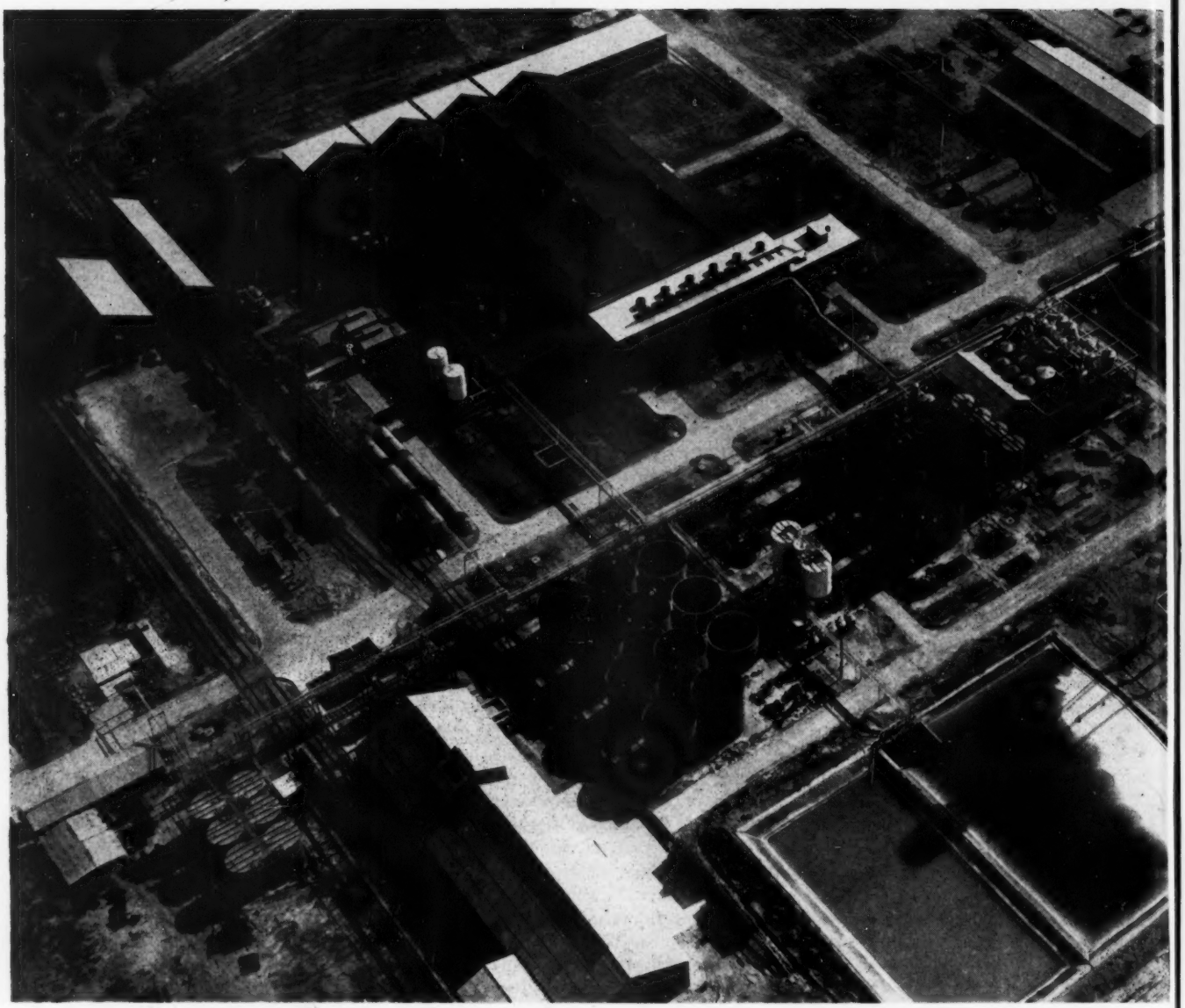
A COOPERATIVE AFFAIR

Particular care must be given constantly to see that due credit for the work goes to each team member. Each must be reminded that the success of the entire project hinges on his cooperation. Since the activities of both production and sales groups increase most rapidly in the final stages of the work, they are frequently accorded an exaggerated portion of credit for the success of the venture. If this happens several times, it may rob other groups of enthusiasm for working on new projects, thereby impairing their efficiency and creative effort. Good top management avoids this difficulty.

Successfully applying research results no longer just happens. It is carefully and logically planned. Only cooperation by every department can insure success.

ESSENTIALS FOR INDUSTRIALIZING RESEARCH DATA

1. Good management.
2. Product equal or superior to any on the market.
3. Existing market or one that can be created.
4. Capital to carry enterprise through development stage.
5. Potential competitive position insured by a suitable manufacturing cost. Patent protection is desirable and often necessary.
6. Raw material sources.
7. Process and plant.
8. Continued research and development to maintain the competitive position attained.
9. Competent personnel for the entire enterprise.



Air view of new electrochemical plant of Diamond Alkali Co. at Pasadena, Texas. The plant is on a 325-acre tract 25 miles from

New Chlorine-Caustic Plant For the Southwest

DIAMOND ALKALI'S NEW HOUSTON PLANT can produce 220 tons chlorine, 240 tons caustic soda daily for Southwest market. Built at cost of $14,500,000.

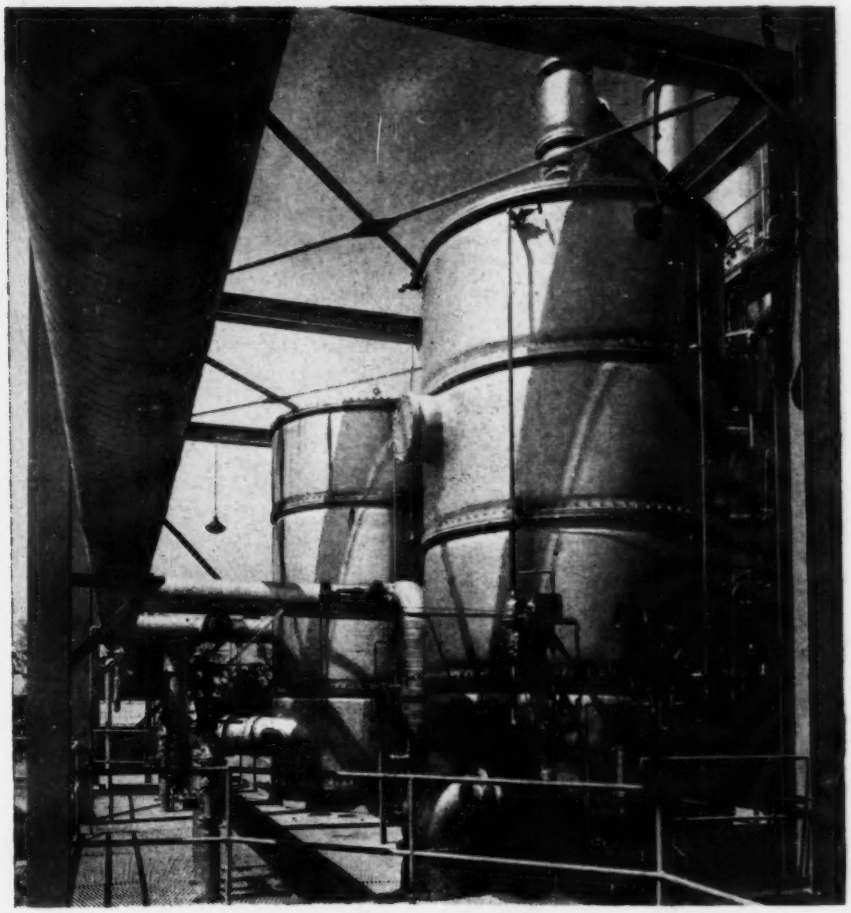
NEWEST major chemical addition to the Southwest's fast-growing industrial empire is the Houston, Texas, works of the Diamond Alkali Co. The new plant, under construction since the summer of 1946, has been completed at a cost of $14,500 000 and will soon be turning out 220 tons of chlorine and 240 tons of caustic soda per day. The plant will also produce some 2,000,000 cu. ft. of hydrogen and 10 tons of hydrochloric acid daily. Perchlorethylene is another product for which production is planned.

Occupying a 325-acre tract 25 miles from the city along the Houston Ship Channel, the plant is strategically located to serve key markets by both water and rail transportation. One customer, in fact, receives liquid chlorine through a 3-in. steel pipeline 10,300 feet long—the longest in the world for this purpose.

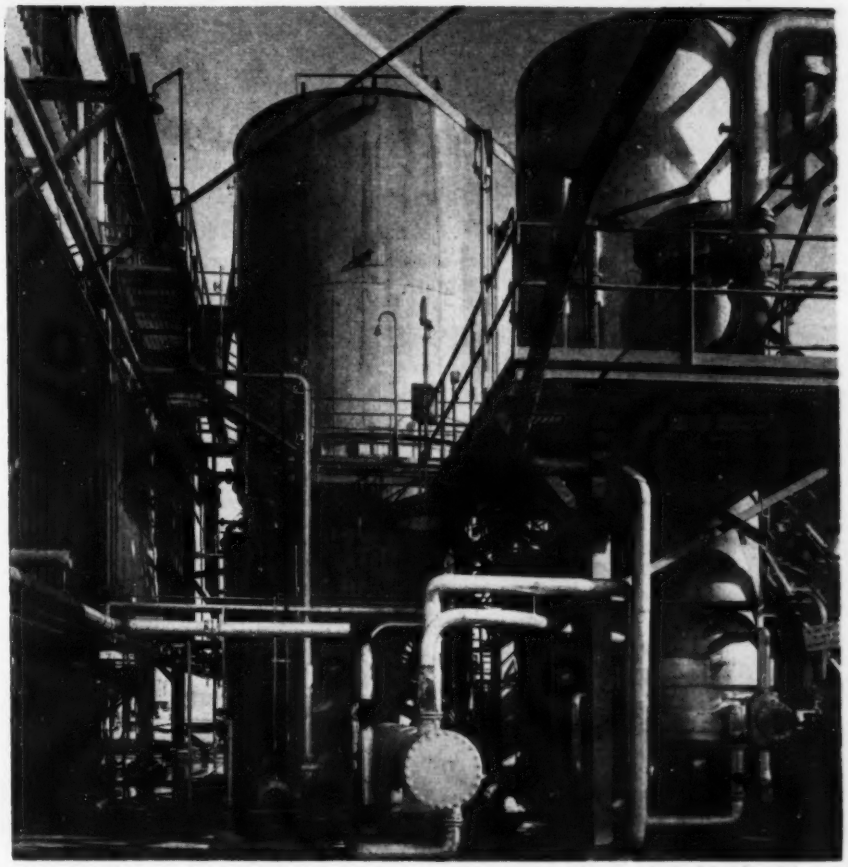
With its Houston plant, Diamond becomes the third major chlorine and caustic producer to enter the Southwest area, the other two being the Dow Chemical Co. at Freeport and Velasco, Texas, and the Southern Alkali Corp. at Corpus Christi, Texas and Lake Charles, La.

The new Diamond plant boasts several process improvements that were worked out by members of the company's research and engineering departments. These include, among others, (1) brine treatment by a "hot process" which, in replacing the conventional "cold method," is said not only to reduce the time required, but also to result in more complete and uniform removal of impurities from the brine solution; (2) liberal utilization of glass and stoneware equipment for cooling and drying chlorine gas; and (3) liquefaction of chlorine in three stage 100-ton centrifugal refrigeration machines, the heat exchange being accomplished directly in a shell-and-tube con-

Houston along the Houston Ship Channel.



Caustic concentration is accomplished in two stages—to 35 per cent in double-effect evaporators and to 50 per cent in single-effect units. Above are two first-effect bodies.



Concentration of 50 per cent caustic to 73 per cent grade is accomplished in this high concentrator. Cooling tanks for 50 per cent caustic are in rear, filter house at left.

denser, with Freon on the shell side and chlorine in the tubes.

BRINE TREATMENT

Brine in 25 per cent solution is pumped to the plant by pipeline from wells at a salt dome 17 miles away. It is stored at the plant site in an open, gunite-lined 650,000 gallon reservoir.

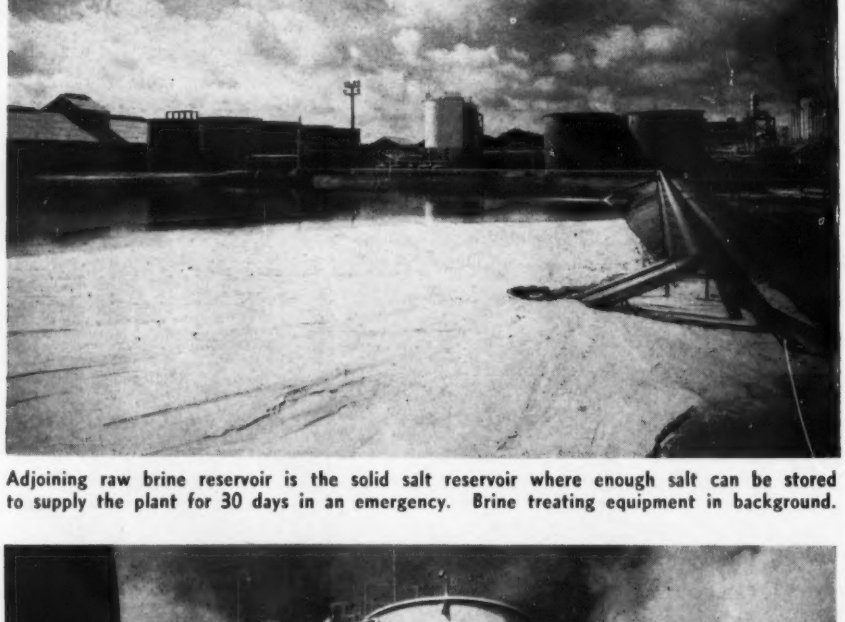
From the reservoir the raw brine is pumped to the "hot process" purification system for removal of calcium, aluminum, iron and magnesium impurities. Three important advantages are claimed by Diamond engineers for the "hot process" over the long-familiar "cold treatment:"

(1) Because of the faster settline rate of solids at higher temperature, greater capacity is obtained with smaller equipment and a more compact layout.

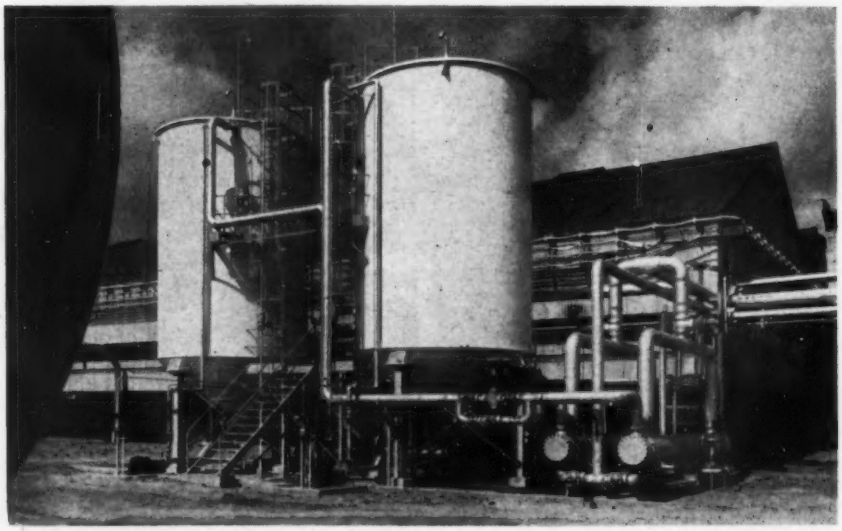
(2) Solubility of mineral impurities is much less at elevated temperature; hence product quality is improved.

(3) Since it is necessary to heat the brine prior to its use as cell feed regard-

The Diamond plant is within 2/3 mile of the Ship Channel. Inlet pumps (foreground) deliver 60,000,000 gal. of cooling water a day to the plant through a 54-in. concrete pipe.



Adjoining raw brine reservoir is the solid salt reservoir where enough salt can be stored to supply the plant for 30 days in an emergency. Brine treating equipment in background.



Brine resaturation tanks located outside electrolytic cell room. Continuous resaturation of cell brine reduces power requirement in cells and prolongs life of carbon electrodes.

less of whether the hot or cold method is used, a conslderable portion of the purification heating cost is offset by the reduced load on the cell feed preheaters.

Two parallel "hot method" purification units are installed in the plant, each with a brine capacity of over 350 gpm. From these the treated brine flows through Anthrafilt pressure filters to storage tanks. On its way to the electrolytic cells, brine from storage is drawn through a two-pass preheater to bring it to 160 deg. F. and then through a 50,000-gal. resaturation tank to which salt slurry recovered from caustic evaporation is added. This slurry is recycled continuously. Passage of the brine through it promotes maximum salt concentration, which, in turn, contributes to longer life of the carbon anodes in the electrolytic cells.

Raised to 180 deg. F. in a double-pass superheater, the brine flows through glass headers into the cell room. Between the superheater and the cell equipment is an "in-line" mixer which, by adding dilute hydrochloric acid to the brine, provides a neutral brine and aids in maintaining strength of chlorine gas at proper value.

CHLORINE PRODUCTION

The plant contains 736 10,000-amp. diaphragm cells of a type designed by Diamond. The cells are rectangular and employ a submerged asbestos paper diaphragm instead of a deposited diaphragm. They are said to provide an unusually high capacity per square foot of floor space.

Glass is used for the entrance headers to the cells and the chlorine exit piping. In addition to corrosion resistance and visibility, the glass pipe was found to give reduced head losses and temperature losses. The wet chlorine from the cells passes through two enclosed glass coolers which bring its temperature down to 60-70 deg. F. It then goes through three ceramic-plate surface drying towers and three cast iron drying towers.

Liquefaction of the chlorine is accomplished by cooling the gas to about minus 20 deg. F. in three refrigerating units incorporating centrifugal compressors, each of which is capable of liquefying 100 tons of chlorine a day. By using this method of liquefaction, rather than the usual method which involves reciprocating compressors, a coolant, a refrigerant, and the equipment to handle these materials, Diamond believes it secures several advantages: lower capital investment, lower power requirement, and a sizeable reduction in the need for operating and maintenance attention.

The idea for this system first originated with Diamond at the Rocky Mountain Arsenal, Denver, Colo., during the war when conventional equipment was hard to get and a 250-ton per day refrigeration unit not then in use at the Arsenal could be pressed into service. Because the set-up not only proved effective but also

simplified the problem of heat transfer and involved far less equipment than the usual industrial installation, Diamond decided to adopt it as standard for its new Houston works.

CAUSTIC EVAPORATION

The cell liquor, approximately 10 per cent caustic and 16 per cent salt, is concentrated to 35 per cent caustic in double-effect evaporators and then to 50 per cent caustic in single units. To obtain 73 per cent caustic part of the 50 per cent solution is evaporated further in a vertical nickel-tube "high concentrator" which has a capacity of 15 tons of anhydrous caustic per hour, evaporating from 50 per cent to 73 per cent.

Bodies and circulating liquor piping of the double-effect evaporators are cast iron. The single bodies are Inconel-clad and the piping is Inconel. All circulating pumps have either Inconel or Monel impellers and trim; the double-effect pumps have cast-iron casings and the single pumps Ni-resist cast-iron casings.

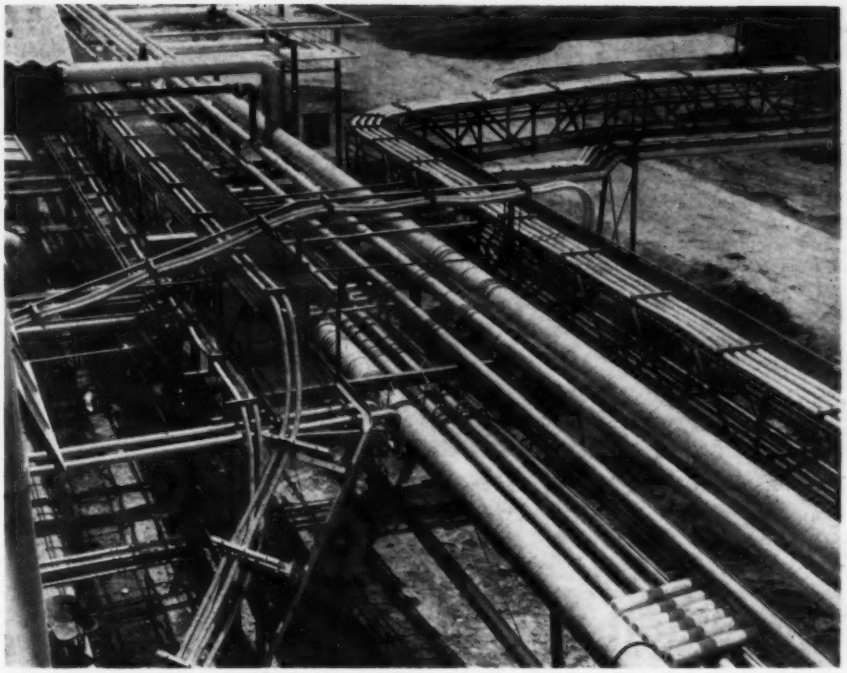
Recently, the high concentrator has been used for making 78 per cent caustic. Operation of the evaporator at this concentration calls for exacting attention and close control, since the freezing curve of caustic soda rises sharply at this strength. Production of 78 per cent caustic will be discontinued upon completion of the solid caustic plant which is now being installed. The solid caustic plant will use a new Diamond-designed closed, continuous process. The packaging section of the plant, it is claimed, will feature automatic and semi-automatic handling to a degree hitherto unapproached in the industry.

UTILITIES

Diamond generates its own power and has provided a large installation for this purpose. It consists of four gas-fired boilers, each capable of producing 100,000 lbs. of steam per hour at 900 lbs psi and 900 deg. F. for three turbine generators with a total capacity of 30,000 kva. Turbine-bled steam is used in heating of brine, evaporation of water, and other general plant requirements. Power from the generators is carried throughout the plant by overhead cables.

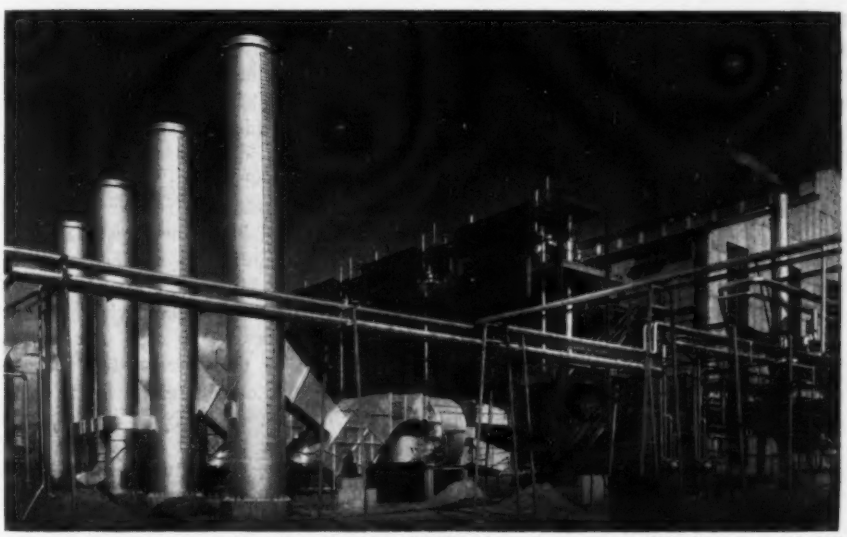
Water requirements of the plant for condensing steam and process cooling are 60,000,000 gal. daily. This is pumped from the Houston Ship Channel, about two-thirds of a mile away.

In its Houston Works, Diamond states it has sought to establish a chemical plant which could become the nucleus of a manufacturing group having eventually a number of production units closely integrated into one operating entity. The plant has been considered as such a nucleus from its inception.



Process piping and power distribution cables are both carried on the same overhead structure, a modified "H" frame topped with supporting beams. Box trusses hang from each beam.

Through this 10,300-ft. pipeline—longest in the world to handle liquid chlorine—a major user of this product in the Houston area receives delivery direct from Diamond plant.



Four boilers, each capable of producing 100,000 lbs. of steam at 900 lbs. psi and 900 deg. F., supply power and process requirements of the new chlorine-caustic soda plant.

The Mission Mill of the Abitibi Power and Paper Co. at Fort William, Ont., provided proof.

Canadian SULFUR on the Way

by HERMAN W. ZABEL, Associate Editor, Chemical Industries

TWO CANADIAN firms vie for $6 million plum represented by Canadian imports of elemental sulfur.

EVERY YEAR more than six million hard-to-get U. S. dollars cross the border from Canada in exchange for some 300,000 tons of Texas and Louisiana sulfur. With the dollar shortage of increasing concern to Canada, the search for methods of reducing these imports has been intensified. Elemental sulfur, the most convenient form for production of sulfur dioxide, does not occur within the boundaries of that country. If a domestic sulfur supply for the needs of the pulp and paper industry is to be found, they must turn to sulfide ores.

At present there are two candidates for the substantial business represented by this demand for sulfur dioxide: Canadian Industries, Ltd., Copper Cliff, Ontario, and Noranda Mines, Ltd., Noranda, Quebec. CIL will produce liquid sulfur dioxide from pyritic copper-nickel ore and ship it to paper mills where it will be used directly. Noranda will distill elemental sulfur from pyrites. This will be shipped (at considerable savings over sulfur dioxide) to mills where it will be burned in existing equipment to the oxide necessary for sulfite pulping of wood.

OXYGEN CIL KEYSTONE

Key to CIL's production of liquid sulfur dioxide is the installation of an elemental oxygen plant (believed to have a capacity of 350 tons per day) for the International Nickel Co. at Copper Cliff. Oxygen generated by this plant will be used to roast the pyritic nickel ore which is the source of practically all nickel produced in North America. Without this pure oxygen, a considerably greater amount of coal would be consumed in providing the temperatures necessary for smelting; with it, the heat of combustion of the sulfur content of the ore is sufficient to raise the temperature to the required level.

Another advantage of the use of oxygen in this process is a gaseous product containing 70 per cent sulfur dioxide instead of the 1.5-8.0 per cent usually obtained. To recover 90 per cent of the sulfur dioxide content of an offgas containing 6 per cent sulfur dioxide, a pressure of 400 psi and a temperature of —95°F. is required. With the 70 per cent gas, 75 per cent of the sulfur dioxide content is removed at a pressure of only 120 psi by means of a water-cooled condenser. Furthermore, 97 per cent of the sulfur dioxide can be recovered by means of a secondary condenser which is cooled to 14°F. by allowing the product separated in the first condenser to boil off in the secondary condenser shell. Such a recovery system will not be used in the new installation; the gases containing the residual sulfur dioxide will be blown into the entrance flue of the sulfuric acid plant which is already on the site.

Utilization of this unseparated sulfur dioxide is not the only reason for a sulfuric acid plant in such an operation. Gases from the roaster are wet with water used to wash out the dust and to cool them. With a plant adjacent to a sulfuric acid unit, they can be dried by passing them up a tower against a stream of 98 per cent sulfuric acid prior to liquefaction. The acid is diluted to a strength of 93 per cent, and is marketed at that concentration; sulfur dioxide of 99.9 per cent is the product.

PAPER MILL TESTS

In spite of this high purity, whether the product would be suitable for pulping remained questionable to those contemplating such a unit. Sulfur dioxide has been considered as early as 1912 in the United States, and used by some Finnish mills since 1930.

The high cost of sulfur dioxide, however, had prevented the idea from going much beyond the talking stage. Because of this mixed experience, it was agreed that a full-dress trial would be required to determine the practicality of the idea.

Very few paper mills in Eastern Canada could be operated on the output of the experimental plant because they are too large. However, the Mission Mill of the Abitibi Power and Paper Co., Ltd., at Fort William, Ontario, was suitable. Abitibi was most willing to cooperate, and, beginning November, 1947, all cooking acid was made from liquefied sulfur dioxide. At the annual meeting of the Canadian Pulp and Paper Association on January 29, 1948, Abitibi reported the success of the experiment, and pointed out the economies that could be expected by direct use of the liquid material instead of air combustion of elemental sulfur. As a result, it is understood that a plant producing about 40,000 tons of liquid sulfur dioxide per year will be installed in conjunction with Inco's new operation at Copper Cliff. This production will satisfy about 10 per cent of the total sulfur requirements of Canadian sulfite pulping operations.

NORANDA

Noranda has operated a 30-ton-per-day test plant in which pyrites are roasted on a slowly traveling hearth. The ore is placed in a thick bed on the hearth and ignited on top. Heat generated by roasting a thin top layer of ferrous sulphide to the oxide vaporizes roughly one-half the sulfur content of the pyrites immediately below, leaving ferrous sulphide for later combustion. By proper gas seals and careful control of the quantities of air and sulfur dioxide through the bed, the high temperature roasting zone is confined to a narrow band which moves slowly down through the bed, progressively decomposing the underlaying pyrite. Vaporized elemental sulfur is condensed, leaving a gas high in sulfur dioxide which can be utilized either for production of sulfuric acid or sulfur dioxide if it should prove desirable.

The residue from the roasting operation, primarily iron oxide, is sintered to produce a suitable blast furnace charging stock.

Through constant research and development, the textile industry has done much to provide cheaper, more efficient products. Typical of this progress are the advancements made in the dyeing of textiles. Often, Victor* formic acid is used as an acidulent in the dye bath. This medium-strength acid produces colors that are both level and fast, and complete exhaustion of the dye assures economy. Because of the volatility of formic acid, danger of tendering the fabric is eliminated. In addition to formic acid, many other Victor chemicals serve as a helping hand in the textile industry.

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Flexible Fyrex, Ammonium Phosphates . . . flameproofing.
Victawet 58 B . . . dispersing agent.
Phosphoric Acid . . . dyeing.
Victamine D . . . textile softening agent.
Aluminum Formate . . . waterproofing.
Formic Acid . . . acidulent in dye bath.
Oxalic Acid . . . bleaching.
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Polycel, purified wood cellulose fiber, is produced in bleached and unbleached form in four grades varying in fiber length: Fluff, 20, 40 and 80 mesh.

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industrial CHEMICAL SALES

division west virginia pulp and paper company

New York Central Building	Leader Building	Pure Oil Building	Public Ledger Building
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New York 17, N. Y.	Cleveland 14, Ohio	Chicago 1, Ill.	Philadelphia 6, Pa.

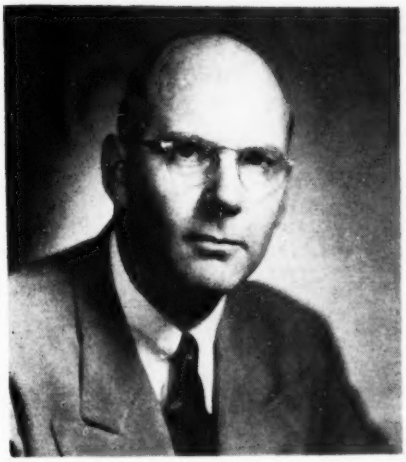
THE CHEMICAL PANORAMA

NEWS OF THE CHEMICAL PROCESS INDUSTRIES IN PICTURES

PEOPLE

A. E. Lacomble, left, who has been elected chairman of the board of Shell Development Co., effective January 1st, and M. E. Spaght, who will succeed him as president of the company.

R. B. Wittenberg, recently named assistant to the president, J. T. Baker Chemical Co.



S. C. Ogburn, Jr., named manager of research and development for the Foote Mineral Co.

W. F. Twombly, appointed vice president in charge of manufacturing, Wito Chemical Co.

Kenneth C. D. Hickman, who has made arrangements to serve both the Eastman Kodak Co. and Arthur D. Little, Inc., as consultant.

Walter Dannenbaum, elected as a director, vice president and member of the Executive Committee, of E. I. du Pont de Nemours & Co.

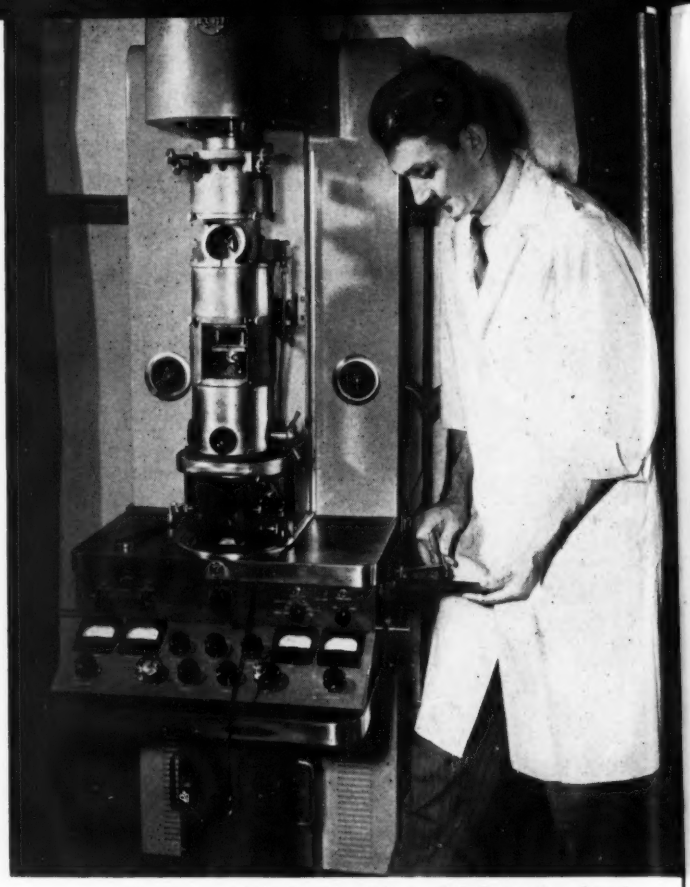
Resinography: New Science

Application of various scientific techniques to the study of synthetic resins will result, believes T. G. Rochow of American Cyanamid Co., in more durable, better looking, and less expensive plastics and coatings. The term resinography is used to describe these techniques, just as metallography refers to a similar study of metals.

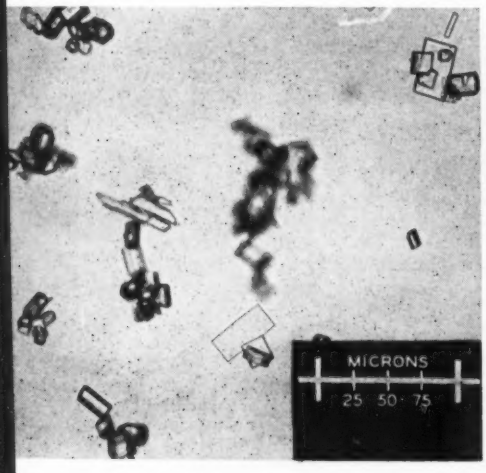
With X-rays, electron microscopes, and other modern instruments, resinographers take pictures of the infinitesimal particles that constitute polymeric materials. The size, shape, and arrangement (whether random or oriented) of these particles determine the strength, smoothness, heat resistance, elasticity, and other properties of the resinous product.

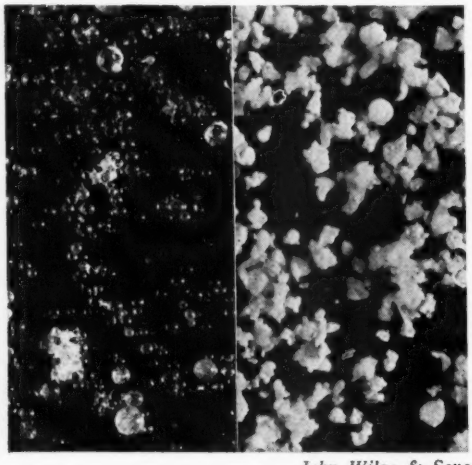
It is very revealing, for example, to study refrigerator and stove enamels by resinographic methods at high and low temperatures—or the change in structure of a paint film when it is exposed to acids, scoured with detergents, or subjected to the action of various chemical agents.

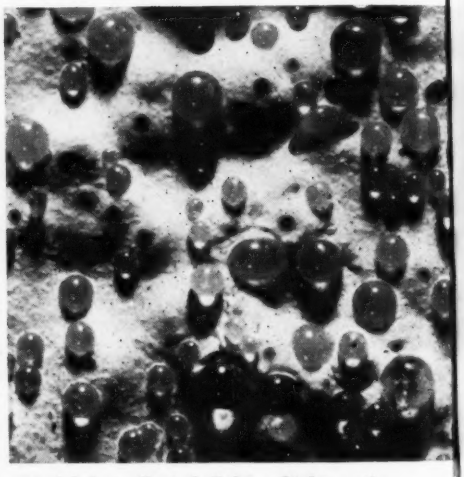
Resinography had its beginnings back in 1924, when two French scientists applied metallographic methods to natural resins for identification and explanation of their physical properties. An American, F. H. Roninger, used similar techniques to study rubber. But it wasn't until the war that the method attracted wide attention and received its descriptive name; and now it's a recognized tool in resin technology.



A member of the Stamford Research Laboratories, American Cyanamid, operates an R. C. A. electron microscope.

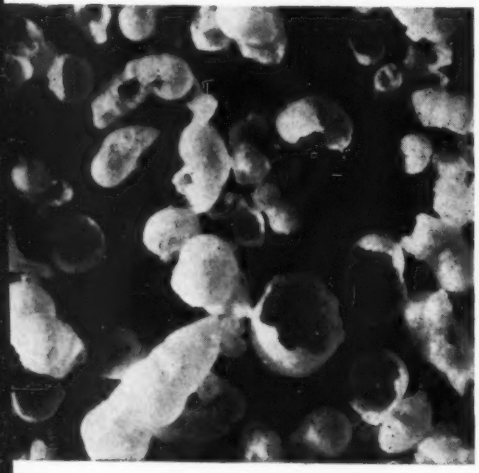


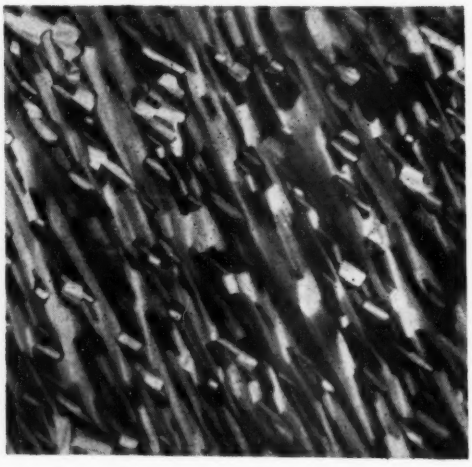


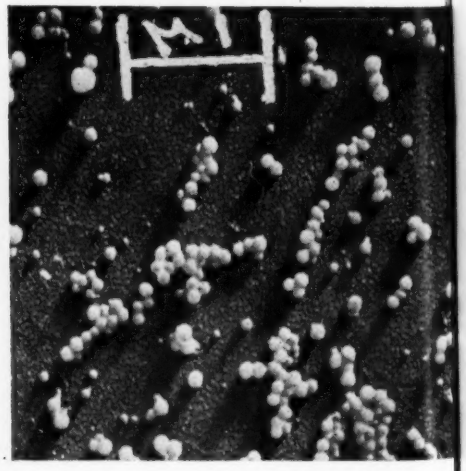


Left, phthalic acid as obtained by the hydrolysis of the potassium salt with dilute hydrochloric acid. Center, 2 types of thermoplastic injection molding material in reflected light. Right, artificially weathered traffic paint, showing reflectant glass beads.

John Wiley & Sons







Left, a spray-dried organic detergent, with shells of solid deposited from a dilute solution. Center, 75% aqueous solution of Aerosol OT, an oil-like liquid composed chiefly of fluid crystals. Right, polystyrene emulsion, micrographed by coating very lightly with gold.

TEC CHEMICAL INTERMEDIATES

FOR DYES

PHARMACEUTICALS

SPECIALTIES

Acetanilide

Amino Hydroquinone Diethyl Ether (2,5-Diethoxy Aniline)

Amino Hydroquinone Dimethyl Ether (2,5-Dimethoxy Aniline)

Amino Hydroquinone Di-n-Butyl Ether (2,5-Di-n-Butoxy Aniline)

N,N-Di (Beta Hydroxyethyl) Aniline (Phenyl Diethanolamine)

N,N-Di (Beta Hydroxyethyl)-m-Toluidine (m-Tolyl Diethanolamine)

N-Ethyl-N-Beta Hydroxyethyl Aniline (Phenyl Ethyl Ethanolamine)

Hydroquinone

Meta Aminophenol

Ortho Aminophenol

Para Aminophenol

Quinone

Triethyl Phosphate

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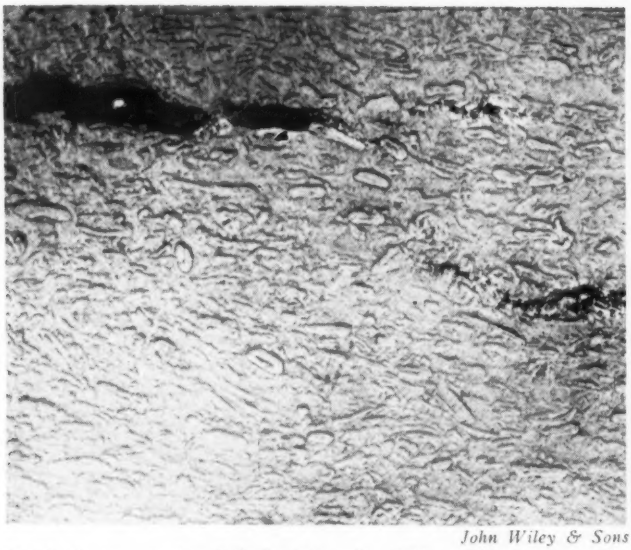
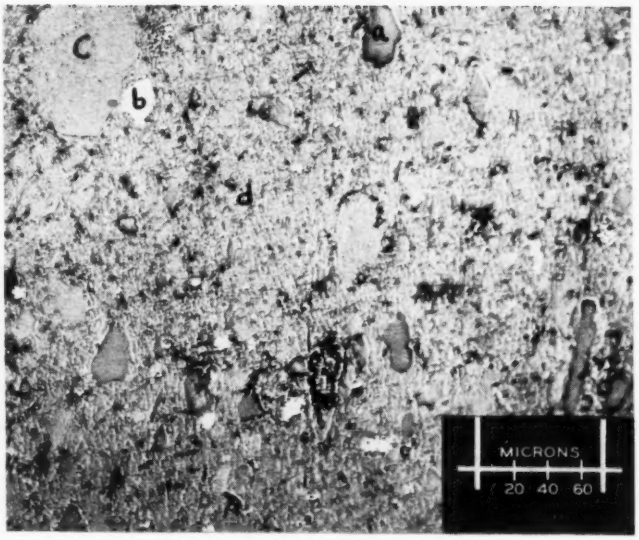


John Wiley & Sons

Cracks in an experimentally burned resin. This specimen is a product of a test to determine the temperature of charring by a lighted bulb. Carbonized boundaries of cracks are shown as white areas.

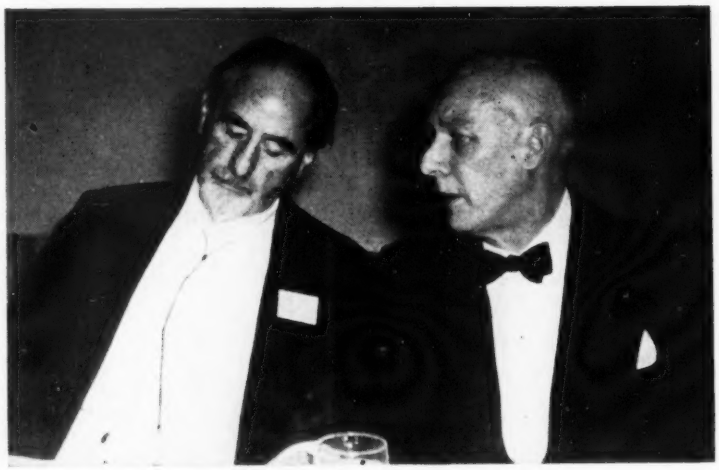


Typical polished cross section of an opaque molded resin. (a) Transparent inorganic constituent. (b) Opaque inorganic constituent. (c) Discontinuous resin phase. (d) Continuous resin phase.

A. I. Ch. E. Meets

A record attendance of 2,400 marked the 41st annual meeting of the American Institute of Chemical Engineers, held Nov. 7-10 at the Hotel Pennsylvania, N. Y. For the first time double technical sessions were scheduled throughout the meeting. They included symposia on chemical plant location, drying, bubble plate efficiencies, and instrumentation.

The following officers were elected for 1949: president, Francis J. Curtis, Monsanto Chemical Co.; vice president, Warren L. McCabe, Flintkote Corp.; secretary, S. L. Taylor; treasurer, C. R. DeLong. The following directors were elected: H. D. Wilde, Humble Oil and Refining Co.; Paul D. V. Manning, International Minerals and Chemical Corp.; Donald B. Keyes, Heyden Chemical Corp.; and Irvin L. Murray, Carbide and Carbon Chemicals Corp.



J. V. N. Dorr, president of the Dorr Co., honorary chairman of the Institute meeting, and Albert B. Newman, C. C. N. Y., president of the Institute.

Robert L. Taylor, editor, Chemical Industries, general chairman of the meeting, Major V. F. Gloag, Francis J. Curtis, and S. D. Kirkpatrick.

V. F. Gloag, vice president, Institution of Chemical Engineers, London, and Francis J. Curtis, newly elected president of A. I. Ch. E.

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Isopropyl Acetate — $(CH_3)_2CHCOOCH_3$
Secondary Butyl Acetate — $CH_3(C_2H_5)CHCOOCH_3$
Isopropyl Ether — $C_3H_7OC_3H_7$
Methyl Ethyl Ketone — $CH_3COC_2H_5$

ENJAY HYDROCARBONS

Butadiene — $CH_2{:}CHCH{:}CH_2$
Isoprene — $CH_2{:}C(CH_3)CH{:}CH_2$
Isobutylene — $CH_2{:}C(CH_3)_2$
Diisobutylene — $CH_2{:}C(CH_3)CH_2C(CH_3)_3$†
Triisobutylene — $CH_2{:}C(CH_3)CH_2C(CH_3)_2CH_2C(CH_3)_3$†
† Other isomers also present.

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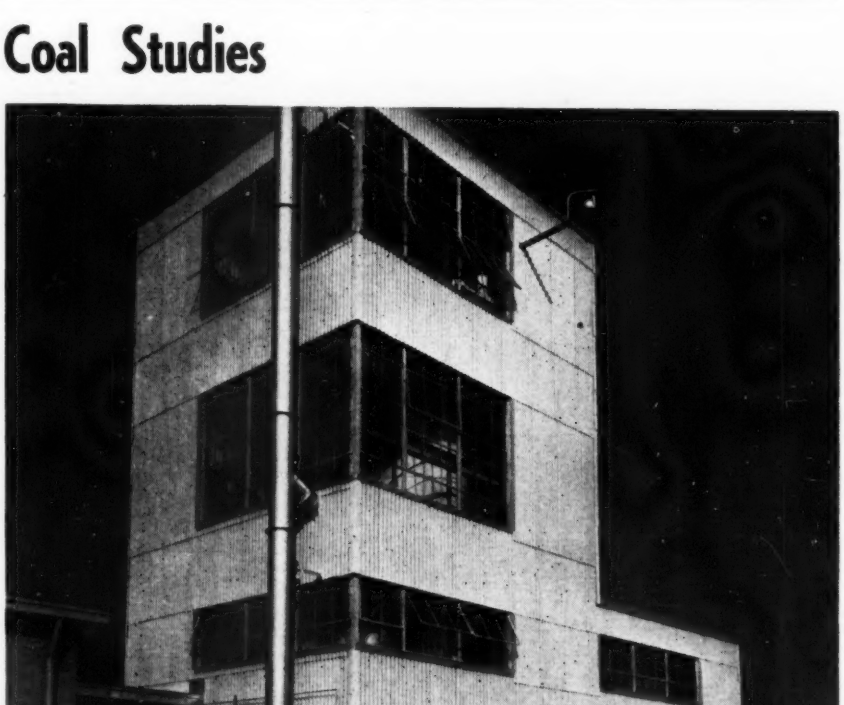
New Phosphorus Capacity

Starting operation last month at Monsanto, Tenn., was Monsanto Chemical Co's fifth and largest electric furnace for production of elemental phosphorus. Rated at over 20,000 kw, the new furnace adds nearly 50 per cent to Monsanto's phosphorus capacity, already one of the largest in this country. The company is also increasing its facilities for production of phosphoric acid and calcium phosphate at St. Louis Mo., and Monsanto, Ill.

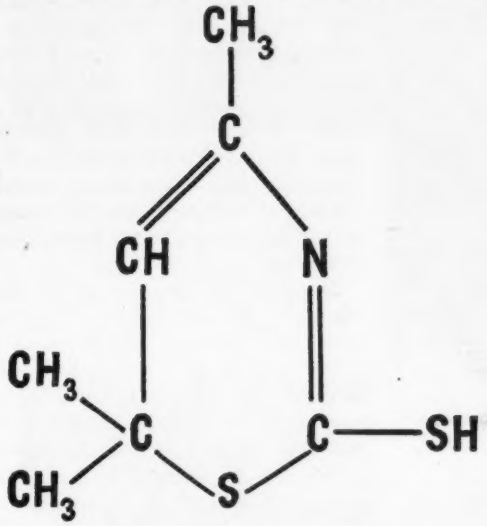
Coal Studies



New pilot designed for the study and development of more efficient coal gasification processes and new markets for coal. The unit, at Library, Pa., was built by the Pittsburgh Consolidation Coal Co. in cooperation with Standard Oil Development Co.

3 Chemicals

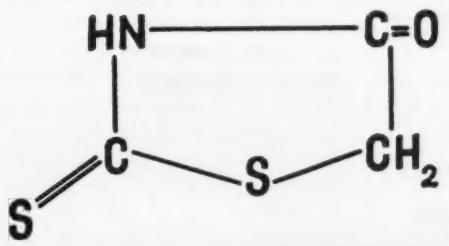
THAT MAY OPEN UP NEW FIELDS



Good-rite M.T.M.T.

2-Mercapto-4,6,6-Trimethyl Thiazine

As an intermediate, M.T.M.T. is expected to find many applications in the manufacture of wetting agents, pharmaceuticals, and other specialty chemicals not heretofore possible. As a new composition of matter, its chemical structure will suggest utility in a wide variety of fields.



Good-rite RHODANINE

2-Thio-4-Keto-Thiazolidine

This material is soluble in alcohol, ether, alkali, and hot water. Rhodanine reacts readily with aromatic aldehydes and the resulting derivatives are useful as intermediates for the manufacture of arylamino acids, arylthio-pyruvic acids, arylacetonitriles, and arylethyl amines, all with unusually high yields.

$NH_2\text{-}CH_2\text{-}CH_2\text{-}OSO_3H$

Good-rite A.E.S.A.

2-Aminoethyl Sulfuric Acid

Source of Ethylene Imine. Suggested for use in the paper industry to increase wet strength and water repellency. Recent laboratory work indicates interesting results in the treatment of cotton fibres. Since aminoethyl sulfuric acid reacts with most compounds containing an active hydrogen atom, the material is widely applicable as an aminoethylating agent.

For detailed technical bulletins on these chemicals please write Department CE-12, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

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Innis Speiden & Co.

Aerosol packages of the four and five pound size have proved successful as cattle sprays to combat flies and other insects. They are also being used for flea control on dogs.

Compressed Gas Aerosols Expand Their Uses

by N. C. COOPER
Chlorine Products Division, Electrochemical Department
E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

REVOLUTIONARY IN ITS EFFECT in the insecticide field, the aerosol method of application is being extended to other chemicals and materials.

EARLY in 1944 Dr. Lyle D. Goodhue, then of the U. S. Department of Agriculture at Beltsville, Maryland, discussed the work carried out at Beltsville on the preparation of small packages of compressed gas aerosol insecticide bombs for the use of troops in tropical areas. The active insecticidal ingredient of the aerosols then developed was pyrethrum extract. To this were added sesame oil, a solvent and synergist, and about 90 per cent Freon 12 (dichlorodifluoromethane) as propellant. At the time only a small amount of work was done on the use of other possible propellants or solvents because of the pressing need for insecticide mixtures of this type to protect occupation forces in various areas of the world.

At the Canadian Section meeting of the Compressed Gas Manufacturers Association in October of 1944, W. W. Rhodes, of Kinetic Chemicals, Inc., included the following statement in a paper on aerosols: "The liquefied gas aerosol method of applying chemicals is of revolutionary character, and it seems probable that when the scientific explorations are completed that it will have a great effect on the prolongation of life, the elimination of insect-carried diseases and the economic production of vegetables and fruits, contributing therefore much to the general advance of civilization."

While in 1944 it may have seemed that Mr. Rhodes' comment was somewhat optimistic, developments since that time have indicated that, if anything, it was too conservative. Let us look at some of these developments.

It is convenient to consider present day aerosol mixtures under three headings: first, those designed for use by the housewife to control flies, mosquitoes, bedbugs, and other insects normally—or abnormally—present in the home; second those designed to control insects and bacteria in larger enclosed spaces, such as stores, restaurants, barns, and greenhouses; third, those to be applied to field crops for control of aphids, beetles, weevils, or similar field insects.

AEROSOLS FOR HOME USE

In the first group, which is confined to aerosol bombs containing not more than sixteen ounces, several important improvements have been made. While the original aerosol bombs supplied to the armed forces contained only pyrethrum as the active ingredient, the present packages contain some DDT also, thus uniting the quick-action properties of the pyrethrins with the valuable residual effect of DDT. The cost of pyrethrum has led to the examination of possible replacement materials. One such material is piperonyl butoxide, now used rather generally as one of the active ingredients along with pyrethrum extract and DDT. Another change in the earlier formula is the use of methylene chloride instead of certain other solvents, for example cyclohexanone.

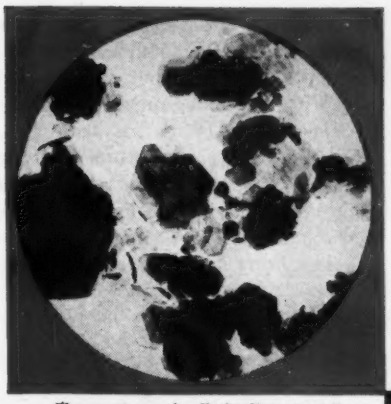
More recently there has come on the market a domestic size aerosol bomb which consists of a beer-can type container equipped with a suitable valve for dispensing the aerosol mixture. The earlier formulations are not suitable for such a package because of the relatively high pressure of the Freon 12 present in large proportion as the propellant. However, this disadvantage has been overcome by using mixtures of methylene chloride or Freon 11 (trichloromonofluoromethane) and Freon 12 so adjusted that the desired pressures are obtained. Approximately one pound of methylene chloride and one pound of Freon 12 plus the active ingredients produce a pressure of about 38 pounds gauge at 70°F. The Freon 12 acts in its usual role of propellant while the methylene chloride serves to reduce the vapor pressure of the mixture to the desired point and, simultaneously, dissolve the active ingredients.

Methylene chloride is not flammable and is considered to have a relatively low toxicity. Concentrations of the order of 500 parts per million are usually considered safe for continuous daily exposure. At the present time aerosol mixtures containing over 50 per cent of methylene chloride have received approval from the U. S. Department of Agriculture, the governing authority for aerosol mixtures.

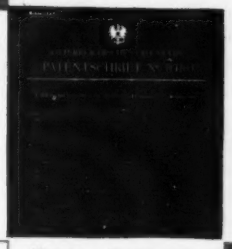
As long as aerosol mixtures containing high percentages of Freon 12 were characterized by internal pressures of 70 pounds or more at 70°F., a container much more rugged than the beer-can type was needed. The cost of these heavier, refillable containers made it necessary to charge a relatively high price for the package. The earlier bombs manufactured by responsible companies cost between $3.50 and $4.00 each through retail outlets, with a refill cost of about $2.00. The beer-can type container, which, of course, is non-refillable, is currently

Condensed from paper "Compressed Gas Aerosol Developments" presented at annual meeting, Canadian Section, Compressed Gas Mfrs. Assoc., September 10, 1948.

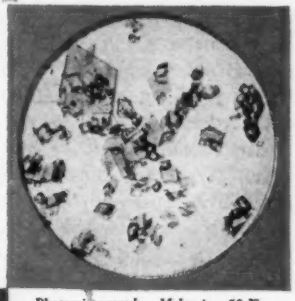
Photographic Chemicals for every Industrial Use



Electron micrograph—Kaolin Clay, 45,000 X.



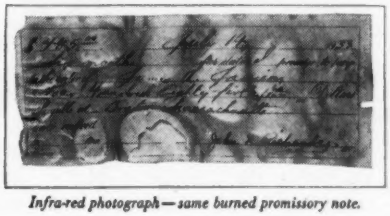
Photostat—Austrian patent.



Photomicrograph—Melamine, 50 X.

Photograph—burned promissory note made by ordinary photographic process, showing illegibility.

Blueprint.



Infra-red photograph—same burned promissory note.

Section of Ultraviolet spectrogram—Iron.

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selling at $1.00 or less for a twelve-ounce package. Present competition is very keen, and it is probable that over the next few years there will be a slight downward trend in these prices as the market becomes established.

AEROSOLS FOR STORES AND GREENHOUSES

The second group of aerosol types has developed over the last three or four years. The usual size package is a 3B300 cylinder with a water capacity of about five pounds. Depending on the mixture in the cylinder, the net contents will vary between four and five pounds.

A great variety of active ingredients may be used, as the choice will be governed by the purpose for which the mixture is prepared. To control flies and insects, mixtures like those employed in the high pressure domestic bomb are used; while for controlling specific insects or aphids in greenhouses, other active ingredients may be required.

Many aerosol mixtures have been developed for the greenhouse trade. The first of such mixtures to receive general acceptance consisted of 10 per cent hexaethyl tetraphosphate and 90 per cent methyl chloride. It is claimed that the active portion of the hexaethyl tetraphosphate is tetraethyl pyrophosphate. As manufacturers have succeeded in preparing a more concentrated product, it is now usually recommended that tetraethyl pyrophosphate be used in the amount of 5 per cent with 95 per cent of methyl chloride.

The 10 per cent HETP aerosol was applied at the rate of 10 grams per 1,000 cubic feet of greenhouse space. The newer 5 per cent TEPP mixture is applied at 5 grams per 1,000 cubic feet and gives an equal kill of insects. Either mixture so applied is sufficient to control several pests, particularly red spider, which is one of the outstanding pests in the greenhouse. However, hexaethyl tetraphosphate —or tetraethyl pyrophosphate—hydrolyzes rather rapidly, and its effectiveness is lost within one or two hours. This, of course, is an advantage from the standpoint of possible hazard to the greenhouse workmen, but the short period of effectiveness makes frequent treatments necessary if the infestation of red spider is serious. The usual method is to give initially about three treatments in ten days, then about one a week thereafter.

Another very useful new insecticide is parathion. This is mixed in the amount of 10 per cent with 90 per cent methyl chloride or with 80 per cent methyl chloride and 10 per cent acetone. Although information on the toxicity of such a mixture is not yet complete, the above formulas have been approved by the U. S. Department of Agriculture, and temporary permits have been issued by the Interstate Commerce Commission to allow shipment in cylinders similar to those already used for the HETP-methyl chloride mixture. While parathion has the outstanding practical advantage of more residual and persistent action than HETP, it may be more hazardous in transportation because of this persistence.

Unlike hexaethyl tetraphosphate, parathion does not hydrolyze rapidly on exposure to moist air. However, the parathion has a strong odor which serves as a very distinctive warning agent. Greenhouse operators who have had experience with the use of parathion mixtures report that concentrations which cannot be detected by odor are not dangerous to human beings. One operator who has used the parathion mixture for almost a year, having prepared the mixture himself from methyl chloride and parathion which he purchased separately, reports no difficulty in the handling of the ingredients and no injury to his workmen. These are non-scientific reports, however, and therefore are open to question.

The method of application is similar to that employed when HETP-methyl chloride mixture is used. Because of the residual action of parathion, applications are less frequent—varying from a week apart to a month apart. The amount applied is ten grams of aerosol per thousand cubic feet, which controls certain insects not controlled by the HETP preparation.

It is apparent that development of specific aerosols for greenhouse use is still in its infancy. Undoubtedly the next few years will see the emergence of many other mixtures designed to kill specific diseases or growths, such as mildew, which injure the saleability of the product.

AEROSOLS FOR CROP TREATMENT

The third group of aerosol packages is the largest size, designed for the treatment of crops. The propellant commonly used for such mixtures is methyl chloride, because of its low price and its ability to dissolve many of the active ingredients—as yet usually DDT or rotenone. In some cases it is necessary to add small quantities of other solvents, generally either methylene chloride or acetone in the amount of 10 or 20 per cent. Occasionally other liquids are added in limited amounts to regulate the size of the aerosol particles, depending on the exact application. It has been found that the particles produced from a mixture containing 20 per cent methylene chloride are substantially smaller than those from one containing a similar percentage of acetone. Thus sometimes it is necessary to add a light oil to increase the size of the particles. It is apparent that extremely fine particles will fail to settle out on the crop promptly and may be blown away if there is any movement of air.

Experimental work has been done in the field on aerosol treatment of crops such as string beans, lima beans and peas. For the most part excellent results have been achieved. At the present time some work is being done on corn, and preliminary results are favorable. While some crops are of such low value that expensive treatment with insecticides is not justified, others readily warrant considerable expenditure. The production of seed grains is a large activity, and to protect such crops a considerable expense for insecticides may be justified. Obviously the cost per pound of active ingredient is appreciable when the material is applied as an aerosol, but the labor cost for application is very low and the efficiency of the active ingredient usually very high.

Foster and Kester Co. Inc.

An aerosol propellant in the lacquer permits this container to double as a spray gun.

Standard cylinders approved for the shipment of the propellant, methyl chloride, are considered to be satisfactory for the transportation of such mixtures.

It is extremely difficult to estimate the potential market for aerosols designed for crop treatment. In the first place only a relatively small number of insecticides have been used in this manner, as yet, so that to date some of the most important pests have not been attacked. For instance, only scouting tests have been made on certain of the pests which affect cotton. This preliminary work indicates that an aerosol insecticide can be applied to cotton crops in the amount of about eight pounds per dose per acre, using about five applications per growing season, to control the boll weevil as well as certain other pests. This aerosol mixture is said to contain chiefly methyl chloride as the solvent and propellant. If the use of such

(*Turn to page 1058*)

fluorine content the potential reserves from this source are around 840 million net tons or an equivalent of 1,750 million tons of fluorspar.

About half of the fluorine is evolved as silicon tetrafluoride vapor which in the presence of water is converted into hydrofluosilicic acid in the production of superphosphates from phosphate rock.

An inexpensive means of converting hydrofluosilicic acid to hydrogen fluoride would mean a tremendous saving toward the conservation of our fluorspar reserves, and at the same time provide a market for a by-product gas which has caused much concern to the phosphate industry.

Lithium Compounds, Bone Residues—Although some fluorine is available in lithium compounds and bone residues, the amount is so small that their value is negligible at present.

FUTURE TRENDS

In view of the economic factors just considered, what can we expect for the fluorspar industry in the near future?

(1) An enlarged program in exploration and development of new deposits of fluorspar.

(2) Continued technological research for improved methods of benefication of low-grade ores.

(3) A program facilitating importation of greatly increased tonnages of foreign fluorspar.

(4) Government stockpiling as an imperative safeguard against a possible emergency.

(5) An expanded research program for new sources of fluorine.

(6) New and increased uses for fluorspar and fluorine compounds in industry.

(7) Rapid expansion of the fluorspar industry in the West and Southwest in spite of the wide differential in freight rates.

At present these appear to be likely trends, which will guarantee an immediate future for the fluorspar industry that will be bright indeed. Our problem, then, in facing the future is to take a long-range view to assure locating new reserves, increasing foreign imports and finding an alternate source of fluorine that will be economically available before this unprecedented demand will have depleted our domestic reserves. As Part II will show, fluorine chemistry alone has reached a position of such importance to industry that we must not permit our known reserves to become depleted without the adequate assurance of an alternate source of supply.

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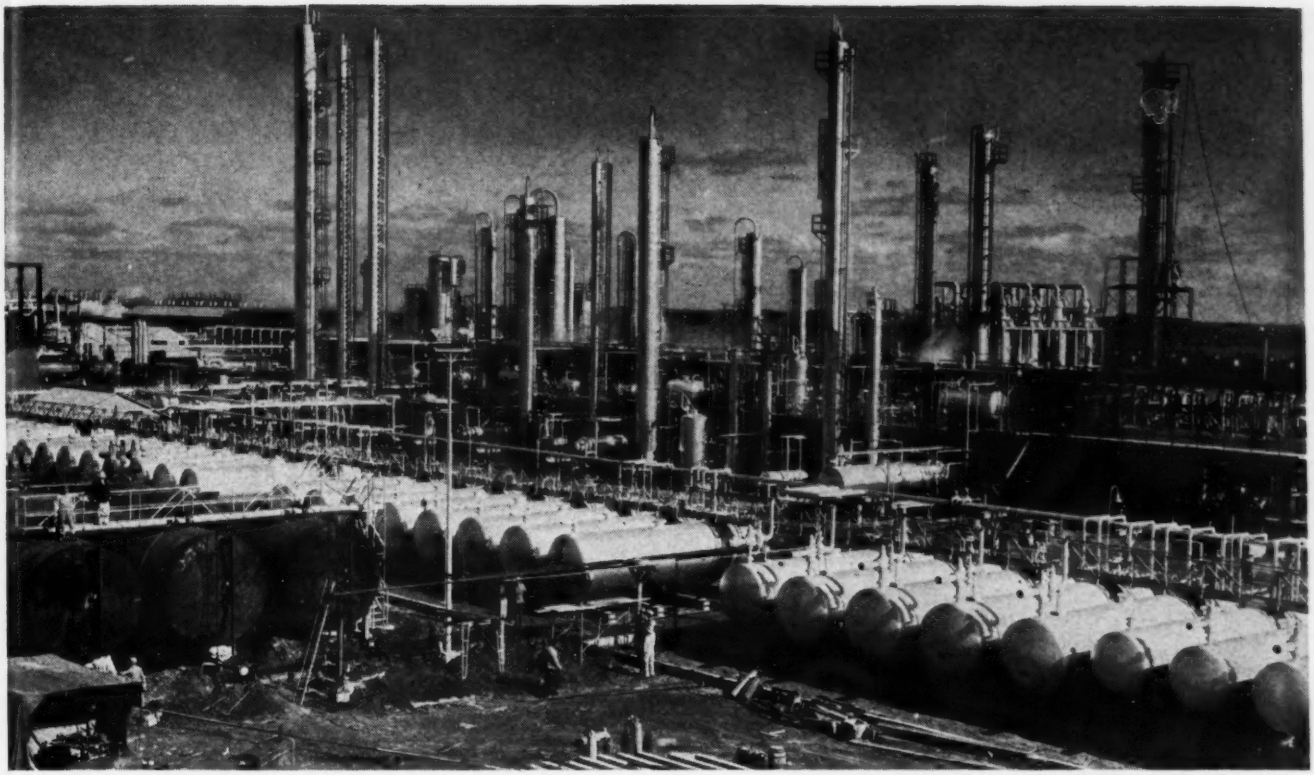
Part 2 of this report, "Fluorine Chemicals in Industry," will appear in the January, 1949, issue.



Sectional view of the Chemcel Plant, Bishop, Texas.

CHEMCEL *geared to Industry*

At its Chemcel plant, near Corpus Christi, Texas, Celanese has incorporated the most advanced engineering techniques for synthesizing organic chemicals from petroleum gases. The result is a flexible plant that can be geared readily to the changing needs of chemical markets. Tank cars carry vital organic compounds daily from Chemcel to industries throughout the nation. This past year, with the completion of storage terminals at Corpus Christi and New Haven, Celanese inaugurated the first tanker movements of formaldehyde—from Chemcel to New England.

While serving today's chemical markets, Celanese keeps an eye to the future through its intensive research program. Begun 16 years ago, this program has resulted in the production of an expanding group of important commercial compounds and new chemicals. Another achievement is represented by the recent completion of the Celanese Petroleum Chemicals Research and Development Laboratory at Clarkwood, Texas. Here, engineers and skilled technicians are working continuously to improve plant processes, to find new applications for current Celanese Chemicals and to develop additional compounds for production at Chemcel.

Celanese is a major producer of formaldehyde, acetaldehyde, methanol, acetone, acetic acid and other organic chemicals. Write for the latest brochure describing these Celanese Chemicals. And, for the organic compounds you need now and will need, look to Celanese.

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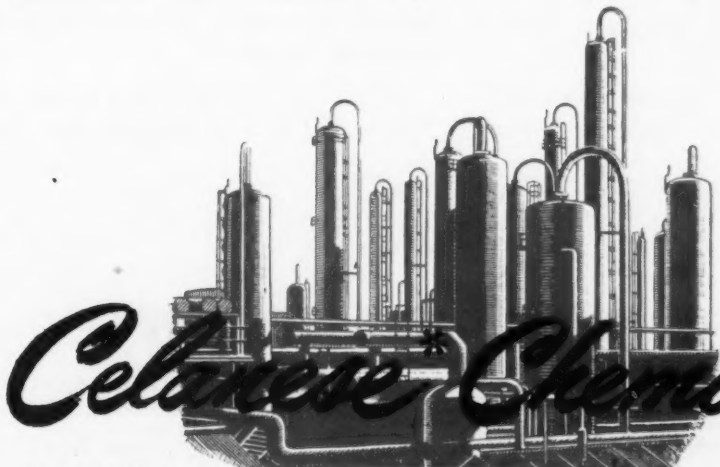

Celanese Chemicals

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ALCOHOLS · ALDEHYDES · GLYCOLS · KETONES · ACIDS · SOLVENTS · PLASTICIZERS

NEW PRODUCTS & PROCESSES

Acetophenone NP 804

Versatile solvent, odor masker and intermediate now available in tank cars.

Large-scale production of acetophenone has been undertaken by Carbide and Carbon Chemicals Corp. The chemical had been previously available only in small lots, but can now be furnished in tank-car quantities at a new low price.

Acetophenone is a good solvent for fats, resins, oils, dyestuffs, and gums. It has a powerful but pleasant odor that makes it valuable as an odor-masking agent in perfume compounding.

Commercial availability of acetophenone will stimulate its application in many new fields. The combination of the benzene nucleus and the ketone group suggests many possibilities for its use as a raw material in the manufacture of dyestuffs, rubber chemicals, pharmaceuticals, and insecticides.

Incidentally, phenyl methyl carbinol also will be put on the market by Carbide in the near future.

Bacitracin NP 805

Several years' research is culminated by production of antibiotic by CSC.

Bacitracin, a new and highly useful antibiotic, is now available commercially from Commercial Solvents Corp.

An outstanding advantage of bacitracin is its comparative freedom from allergic reaction. An added feature is its effectiveness against many strains of pathogens resistant to penicillin.

The earlier studies on bacitracin were carried out under an OSRD contract with Columbia University and continued under an agreement with the Surgeon General's Office when the OSRD was discontinued. During the past three years, further laboratory and clinical evaluation of this new antibiotic, conducted under the auspices of CSC Pharmaceuticals, a division of Commercial Solvents Corporation, has culminated in the announcement of the availability of bacitracin to the medical profession.

Silanes NP 806

Linde offers four pilot-plant organosilicons for research.

Linde Air Products Co. is entering the field of organosilicon chemicals. This step has been taken after years of extensive research and development which has led to processes for the economical production of a variety of these useful new compounds. The company is planning to sell the silanes, the building blocks for siloxane polymers, and is offering for sale at this time four such compounds: ethyltrichlorosilane, amyltrichlorosilane, ethyltriethoxysilane, and amyltriethoxysilane.

The silicones are finding rapidly increasing use in many industries; their ability to withstand high temperatures and weathering has found many useful applications. Since the silanes impart many of these important properties themselves, and can also be used to form the siloxane polymers, they are valuable new materials to many industries.

The four alkylsilanes being offered for sale are now available only from pilot-plant production in small lots which are sufficient to allow initial research or testing in proposed applications. Their prices range from $3 to $4.25 per lb. When a larger unit is completed they should be obtainable in drum lots at lower cost. The company believes that they can be made on full commercial scale to sell within the price range of organic intermediates.

Dihydrostreptomycin NP 807

New streptomycin derivative is made by Merck and Pfizer.

Production of dihydrostreptomycin, a new streptomycin derivative used in the treatment of tuberculosis and causing much less dizziness and disturbance in equilibrium than occurs with prolonged administration of streptomycin, has been started by Merck & Co., Inc., and Chas. Pfizer & Co., Inc.

Merck's new product is in pilot-plant production, and manufacturing facilities are being prepared at the Stonewall plant. Full-scale production will be started as soon as these facilities are available. The product first will be distributed to domestic outlets and later, as supplies increase, it will also be made available to the export market.

As supplied by Pfizer, the new streptomycin derivative will be in the form of its sulfate salt, and known as Dihydrostreptomycin Sulfate-Pfizer.

Dihydrostreptomycin sulfate, like other Pfizer antibiotics, will be available to the medical profession through a number of the leading pharmaceutical companies. For export, dihydrostreptomycin, like the other Pfizer antibiotics, is being offered under the Pfizer label.

Paint Products NP 808

A one-coat house paint and a vapor-proof paint are introduced by Glidden.

Two new paint products have been introduced by the Glidden Co.

The first is an entirely new one-coat outside white house paint. Called Endurance Imperial, the new paint has been successfully tested for more than six years on more than 1000 different structures throughout the country.

The second, called Spred Vapor Barrier Primer and Sealer, is a dual-purpose product heralded as a tremendous cost saver in all types of new construction. Used as a primer, one coat of it seals more perfectly than any other material tested by a government agency. Used as a vapor barrier on the inner surface of exterior walls, it completely eliminates the need for vapor barrier paper required in new frame construction.

Magnetic Materials NP 809

Nonconducting magnetic ferrites reduce size of electrical equipment.

New magnetic ferrite materials, having unusual properties that permit a considerable reduction in the physical size of electrical components such as inductors and transformers, have been developed in the laboratories of the Philips Company

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FORMALDEHYDE

Formaldehyde Solution U.S.P. A clear, colorless liquid of the highest purity. For water repellents, glazes, resins, anti-mildew agents. For crease-proofing and crush-proofing. Shipped in tank cars, drums, carboys, bottles; in tank trucks (N.Y. metropolitan area only).

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For dyeing of acid colors; wool treatment for moth-proofing; emulsions for impregnating fabrics; as a sour to prevent yellowing; acid wash after sulfur coloring and dyeing. Shipped in 125 lb. carboys.

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U.S.P. and Technical Grades. For the preparation of water repellents; production of fast prints on textiles. Shipped in 200 lb. bbls.; 100, 50 and 25 lb. fiber drums.

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in the Netherlands. They will be manufactured and marketed in this country by North American Philips Company, Inc., under the trade mark Ferroxcube.

These magnetic ferrites, which consist essentially of homogeneous mixed crystals of metallic oxides and iron oxide, have high magnetic permeabilities and low remanence and coercivity. In contrast with the usual magnetic materials which are highly conductive, the new materials are essentially electrically insulating.

The properties of these materials make them particularly adapted for high-frequency inductance coils, radio transformers and other electromagnetic apparatus.

Fluophosphoric Salts NP810

Several salts of the various fluophosphoric acids are now being made.

Ozark-Mahoning Co. has recently inaugurated a program calling for pilot-plant production of several salts of the fluophosphoric acids which were first made by this company several years ago. The FP acids are monofluophosphoric (H_2PO_3F), difluophosphoric (HPO_2F_2) and hexafluophosphoric (HPF_6). The salts now available are the sodium and calcium monofluophosphates (Na_2PO_3F and $CaPO_3F{\cdot}2H_2O$) and the potassium, ammonium, pyridinium hexafluophosphates. Two quaternary ammonium hexa salts are also available: tetraethylammonium (Et_4NPF_6) and benzyltrimethylammonium hexafluophosphate ($C_6H_5CH_2(CH_3)_3NPF_6$).

It is expected that these FP Compounds will find applications as catalysts, fungicides, fluxes, electrolytes for plating or polishing of metals, as anthelmintics, and in dental hygiene.

Germicide NP811

A phenolic derivative is produced commercially by Monsanto.

Monsanto Chemical Co. reports that a powerful germicide, a substituted phenol, is now available for the first time in commercial quantities.

The germicide is being sold under Monsanto's trade name Santophen 1. It is effective against both fungi and bacteria and is non-irritating in usage dilutions, according to technical data released by the company.

Although the germicide shows phenol coefficients in the order of 150 to 200 against standard test organisms, and kills fungi in concentrations of .005% to .05%, tests have shown that it is relatively nontoxic to higher animals.

A dry, non-dusting, flaked solid, Santophen 1 germicide is not a mixture of isomers, and thus its properties are dependable and predictable. It can be formulated readily with commercial dispersing agents to give aqueous concentration with high phenol coefficients. It is a nearly colorless compound and does not stain or discolor surfaces.

Floor Waxes NP812

Ultra Chemical Works sells three new waxes for private-label distribution.

Three no-rubbing, self-polishing floor waxes have been made available to distributors in the industrial maintenance field, for private brand-own label use, by Ultra Chemical Works, Inc. All three grades—Ultra Supreme, Ultra Heavy Duty, and Ultra Economy—contain Ultrapone, a synthetic emulsifying and leveling agent, assuring even application of a hard, lustrous finish, exceptionally free of streaks. All three, made from top grade carnauba wax, are excellent for both asphalt tile and linoleum.

Wetting Agents NP813

Three new wetting agents have been introduced by Arnold, Hoffman & Co.

Three highly effective surface-active agents have been introduced by Arnold Hoffman & Co., Inc.

Ahcowet N is a new non-ionic wetting agent that remains unaffected by salts and alkali. It has extensive applications

What made this baby grow so fast?

A comparatively new addition to the American industrial family . . . the plastics industry has already come of age. A giant in size, its products touch the lives of everyone, every day, in literally thousands of ways. Barrett is proud to be one of the chemical suppliers who have made this spectacular growth possible. We have made available increasing quantities of chemicals—dibutyl phthalate, dicyclohexyl phthalate, Plasticizer 50-B, phthalic anhydride, phenols, cresols, CUMAR* resins, Resin S, and others—used in the manufacture of a great variety of plastics. Helping other businesses to prosper has made Barrett "one of America's great basic businesses."

BARRETT PLASTICIZERS

DIBUTYL PHTHALATE—A clear, high-boiling, water-white liquid widely used as a modifying agent and plasticizer for synthetic elastomers and natural and synthetic resins.

DICYCLOHEXYL PHTHALATE—A white, granular plasticizer used in supported and unsupported vinyl films. Imparts increased toughness and tear strength and materially aids processing.

PLASTICIZER 50-B—A new plasticizer of particular value in compounding and processing of supported and unsupported vinyl films and extruded products, it helps to eliminate calendering and extruding difficulties, and aids in providing a soft hand, high gloss and clarity.

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Barrett*

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in operations where the above conditions normally exist.

Ahcowet LR, a wetting and rewetting agent for the leather industry, substantially reduces the time involved in rewetting hides before processing.

Anhydrous Ahcowet RS is a concentrated wetting agent containing 98-98.5 per cent active ingredients. Because it is solvent-miscible, as well as water-soluble, it is recommended for use as an emulsifier and plasticizer in the insecticide and asphalt industry.

C_7 Compounds NP 814

Wallace & Tiernan are pilot-plating several heptaldehyde derivatives. Wallace & Tiernan Products, Inc., announces the availability on a pilot-plant production scale of a number of heptaldehyde derivatives. These include heptyl alcohol, heptanoic acid, various esters of the alcohol and acid, and other derivatives such as heptanoic nitrile, heptyl amine, and similar products.

Steel Coating NP 815

Stainless steel is incorporated in new coating applied like paint. With a new product called Liquid Stainless Steel, developed by the Plastics Division of The Lockrey Co., it is now possible to apply a coating of pure stainless steel to any surface, by brushing or spraying, in much the same manner as a coat of paint would be applied.

By a new process stainless steel is broken down into flakes of microscopic size, so fine that it flows almost like a liquid, and this material is incorporated in a liquid plastic and solvent to bring it to brushing consistency. The resulting coat combines the beauty and durability of stainless steel with the water, heat and chemical resistance of plastics. It can be used on all wood surfaces exposed to fresh or salt water or spray, or in any household or industrial use for either decorative or protective purposes.

Liquid Stainless Steel exhibits good adhesion to both wood and metal, as well as other finishes, and is quick-drying.

Hydraulic Fluid NP 816

Standard of Cal. is marketing a nonflammable hydraulic fluid for aircraft. Immediate marketing of the first completely nonflammable aircraft hydraulic fluid that will not ignite when subjected to a 5000-degree flame is being undertaken by Standard Oil Co. of California. The new product will eliminate a fire hazard in planes that use very high-pressure hydraulic systems for operation of landing gear mechanism, flight control surfaces, and cabin superchargers. The new fluid has actually proved to be so resistant to fire that its use in fire extinguisher systems on planes is a possibility.

Some modifications of present hydraulic systems will be required before the new fluid, to be known as RPM Nonflammable Hydraulic Fluid, can be used generally.

In addition to complete nonflammability, which is retained even after long exposure to air, the new product retains fluidity and other necessary characteristics from —70° to +250°, is noncorrosive to all metals used in aircraft, and lubricates at pressures exceeding 3000 psi. It will be sold by the aviation division of Standard's marketing department.

Enamel Resin NP 817

Cyanamid's styrene-alkyd resin is designed for industrial finishes. A new type of synthetic resin for fast-drying enamels is now being made by the Coatng Resins Department of American Cyanamid Company. The new product, a copolymer of styrene and alkyds, will be marketed under the trade mark of Cycopol.

This resin is especally adapted for use in industrial finishes, and in fast-drying household enamels. The outstanding qualities of Cycopol, in addition to its very fast drying, are pale color, excellent toughness and adhesion to metal surfaces.

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a high degree of durability, high gloss, and good color retention. Enamels made with Cycopol resin may be brushed or sprayed.

Cycopol resin will find extensive use in high grade enamels for household and industrial purposes, as well as for machinery and farm implements.

Plasticizers NP 818

Ohio-Apex introduces two plasticizers based on iso-octyl alcohol.

Ohio-Apex, Inc., is now in commercial production of two new plasticizers tradenamed Adipol 10A and D.I.O.P. These two new plasticizers are di-iso-octyl adipate and di-iso-octyl phthalate, respectively. This is believed by the company to be the first commercial production of these compounds in this country.

Hydrogen, Helium Isotopes

Isotopic hydrogen and helium will aid medical, biological and chemical research.

Limited quantities of two important new research materials—hydrogen-3 and helium-3—have been added to the list of isotopes being distributed by the U. S. Atomic Energy Commission to scientists and research institutions throughout the United States.

Hydrogen-3, also called tritium, is a radioactive gas with a half-life of approximately 12 years. As the only radioisotope of hydrogen, it should prove of special value as a "tracer" in medical, biological and chemical research. When combined with oxygen, tritium can also be used as heavy heavy-water.

Helium-3, a stable isotope, is only one-millionth as abundant in nature as ordinary helium. Now that it is available for laboratory study, it may provide valuable clues to the still largely unknown properties of the helium nucleus.

Tritium is isolated after the bombardment of a lithium compound by slow neutrons in a nuclear chain-reacting pile, and helium-3 is obtained as the end product of the decay of the radioactive tritium.

Distribution of the newly-available materials will be handled in the same manner as other radioactive and stable isotopes produced at Atomic Energy Commission installations. Inquiries should be addressed to the Isotopes Division, Atomic Energy Commission, Post Office Box E, Oak Ridge, Tennessee.

Salt-Containing Rubber Tread NP 819

Rubber recap contains rock salt, gives better traction on icy roads.

A new type tire tread, containing ordinary rock salt and giving as much as 30 per cent better traction on ice-covered

WYANDOTTE HYDROTROPES

TYPICAL PROPERTIES

	NAXONATE Sodium Xylenesulfonate		SODIUM BENZENESULFONATE		SODIUM TOLUENESULFONATE		SODIUM p-CYMENESULFONATE	
	SOLUTION	POWDER	SOLUTION	POWDER	SOLUTION	POWDER	SOLUTION	POWDER
Color	*Straw*	*White to cream*	*Amber*	*White to cream*	*Amber*	*White to cream*	*Amber*	*White to cream*
Active Agent	42.4%	96.5%	31.6%	95.1%	41.0%	93.8%	31.9%	96.4%
Inorganic Salts (alcohol insolubles)	0.7%	2.4%	1.4%	4.6%	2.0%	4.9%	0.08%	0.14%
Water Insolubles	0.0%	0.04%	0.0%	0.02%	0.0%	0.06%	0.0%	0.03%
Water	56.9%	1.10%	67.0%	0.3%	57.0%	1.2%	67.3%	3.4%
Specific Gravity at 25°C./25°C.	1.175	—	1.160	—	1.196	—	1.107	—
Struck Density (lbs. per cu. ft.)	—	35	—	29	—	17.7	—	22
Packed Density (lbs. per cu. ft.)	—	50	—	52	—	31.3	—	42
pH at 25°C.	7.5	7.7*	7.9	7.1*	9.6	8.1*	8.4	6.1*
Decomposition Temperature	—	>355°C.	—	>325°C.	—	>285°C.	—	>305°C.

*1% *solution*

The importance of Wyandotte Hydrotropes to industry is becoming increasingly evident. While Naxonate is the "work-horse" of the hydrotrope line, the homologues are recommended for specific applications where their performance is outstanding or where Naxonate, for some reason, does not fully meet the requirements.

Naxonate is being produced on a commercial scale and the homologues are being produced, at present, on a pilot plant scale. Commercial production on the homologues can be rapidly attained when demand warrants it.

Write the Development Department for samples of these chemicals.

Copies of the following literature will be forwarded upon request:

Naxonate booklet
Sodium benzenesulfonate data sheet
Sodium toluenesulfonate data sheet
Sodium p-cymenesulfonate data sheet
Reprint from Chemical Industries, May, 1948: "What's New," "Chemical Copula"
Reprint of "Use of Hydrotropic Solutions in Industry" by Dr. Ralph H. McKee, Industrial & Engineering Chemistry, Vol. 38, p. 382, April, 1946
Reprint of "Hydrotropic Solubilities" by Drs. Booth and Everson, Industrial & Engineering Chemistry, August, 1948

slippery roads than conventional treads, has been developed by United States Rubber Co.

Intended for recapping worn tires for safer winter driving, the tread material, called Wintrac, consists of high quality tread stock into which thousands of pieces of rock salt have been mixed. As the tread wears down, the pieces of salt are released to form surface pores which grip the slightest road irregularity.

Xylidines NP 820

Several xylidines for use as intermediates are now produced on plant scale.

Atlantic Chemical Corp. announces that its Nutley, N. J., plant is now in full-scale production of new intermediates for the pharmaceutical, essential oil and dyestuffs industries.

Among those produced are vicinal ortho-xylidine, asymmetrical meta-xylidine (tech.), and para-xylidine (tech.).

Technical data, experimental samples or plant-size shipments are available.

Textile Anti-Shine NP 821

Non-flammable, aqueous solution eliminates shine on fabrics.

Vitatex Products Corp., New York City, is introducing under the name of "Killshine" a product claimed to remove the shine from clothing without injury to the fabric. The material, which bears the Good Housekeeping Guaranty Seal, upon application to the shiny area of a piece of material, temporarily softens the tiny fibres which normally form the nap. While these fibres are in this pliable state, they are brought back to their original position by the brushing action used in the treatment, thus restoring the nap and killing the shine. On fabrics that have no nap, shine is usually the result of a flattening of the fibres that make up the material. "Killshine" temporarily softens these fibres and the brushing action restores them to their original shape, thus killing the shine.

The new product is an aqueous solution, non-inflammable, non-explosive, acid- and abrasive-free, and not injurious to skin.

Benzene Hex NP 822

"High-test" benzene hexachloride is now available in larger quantities.

Larger commercial quantities of high gamma content benzene hexachloride insecticide are now available from the Pennsylvania Salt Manufacturing Co. Known as Penco "Hi-Gam" W-25, this insecticide is a wettable powder containing 25 per cent of the substantially pure gamma isomer of benzene hexachloride, prepared by a special refining process, as its active ingredient.

Designed for use in water suspension

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sprays, this material also may be used as a base for the formulation of finished insecticide dust. It is recommended for the control of many insects which attack fruit trees and for control of aphids and leaf miners on spinach.

Hand Cleaner NP 823

Waterless hand cleaner contains lanolin, no ammonia.

A new waterless cleaner which removes grease, dirt and grime from hands in one application is now being manufactured by Schaffner Industries, Inc., Pittsburgh. This product, called "Little Doc" Disolvit, contains lanolin to protect the skin, and is free from skin-drying ammonia.

The hands are cleaned by rubbing on about one teaspoon of the material and then wiping it off with a dry cloth. Disolvit is available in pints, quarts, gallons and five gallons.

Insecticide

USDA develops insecticide mixture to control cotton caterpillars.

Salt marsh caterpillars by the millions, causing the worst outbreak of the pests in the history of the Salt River Valley of Arizona, have been reported by the U. S. Department of Agriculture. Much of the cotton now has been defoliated.

A new insecticide dust mixture composed of 15 per cent chlorinated camphene plus 5 percent DDT in 40 percent sulphur, in preliminary field tests, has been found by entomologists of the Department's Bureau of Entomology and Plant Quarantine to give excellent control of this pest on cotton.

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NEW EQUIPMENT

Water Cooled Conveyor QB686

A new type of cooling conveyor developed by the Conveyor Dept. of Sandvik Steel, Inc., carries molten chemical products on a solid stainless steel belt that is actually supported by the cooling water itself.

The patented water-bed design assures 100% coolant contact with the underside of the steel belt. This provides an unusually high cooling capacity. Molten chemicals that are poured onto one end of the conveyor can be taken off in strip form at the opposite end. Tapered rubber strips fitted to the edges of the flat, stainless belt hold the liquid chemical on the belt surface.

In operation, the top band of the continuous belt passes over a water-bed formed by a series of tanks connected so as to form one continuous trough. When the conveyor is used for cooling, these tanks are usually filled with circulating water, though other coolants can be substituted if desired. When the unit is operating, the water pressure is just enough to raise the belt off its supports. The surplus water overflows into adjacent gutters which collect and return it for recirculation.

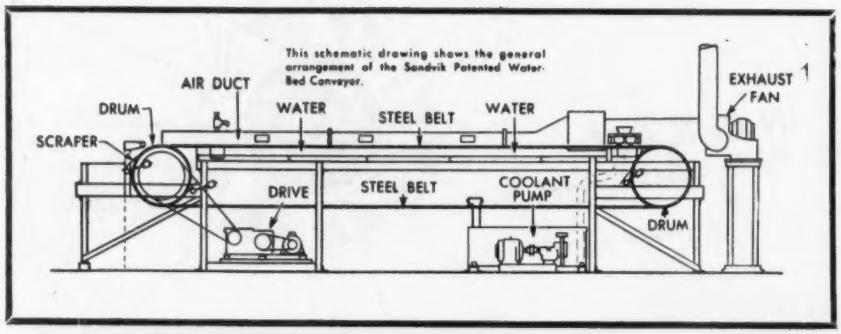
High Speed Temperature Recorder QB687

A new Speedomax instrument by Leeds & Northrup Co. automatically logs as many as 160 separate thermocouple temperatures in succession at a rate of 4 seconds per point. Because each point is checked at such frequent intervals, high or low temperatures which may develop can be spotted readily before serious trouble results.

In case of trouble, the operator can cut thermocouples out of the measuring sequence in banks of 20 at a time, until the instrument is concentrated on the particular group of temperatures in which he is interested at the moment. Or, he can set the instrument to record any single thermocouple, or to record all points continuously.

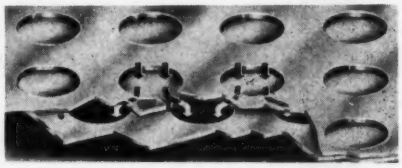
In usual operation, the instrument simply indicates while numbered lights identify each couple. Should any temperature reach a preset limit, the Speedomax automatically starts its recording chart drive, begins to record all points as a series of numbered dots, and operates an alarm.

The equipment consists of two parts, a recorder and a switch assembly—both housed in separate cases.



Metallic Filter Medium QB688

A unique metallic filter medium has been developed by W. S. Rockwell Co. This rigid, non-plugging, long lasting medium, Neva-Clog, gives superior filtration performance and brilliant clarity at economical flow rates. The construction is simple. Two sheets of metal of the desired gauge are accurately perforated with holes of about .045" diameter, spaced to provide about 120 holes per square inch. One of these sheets is superimposed on the other and so aligned that the unperforated portions of the top sheet block off the holes of the bottom

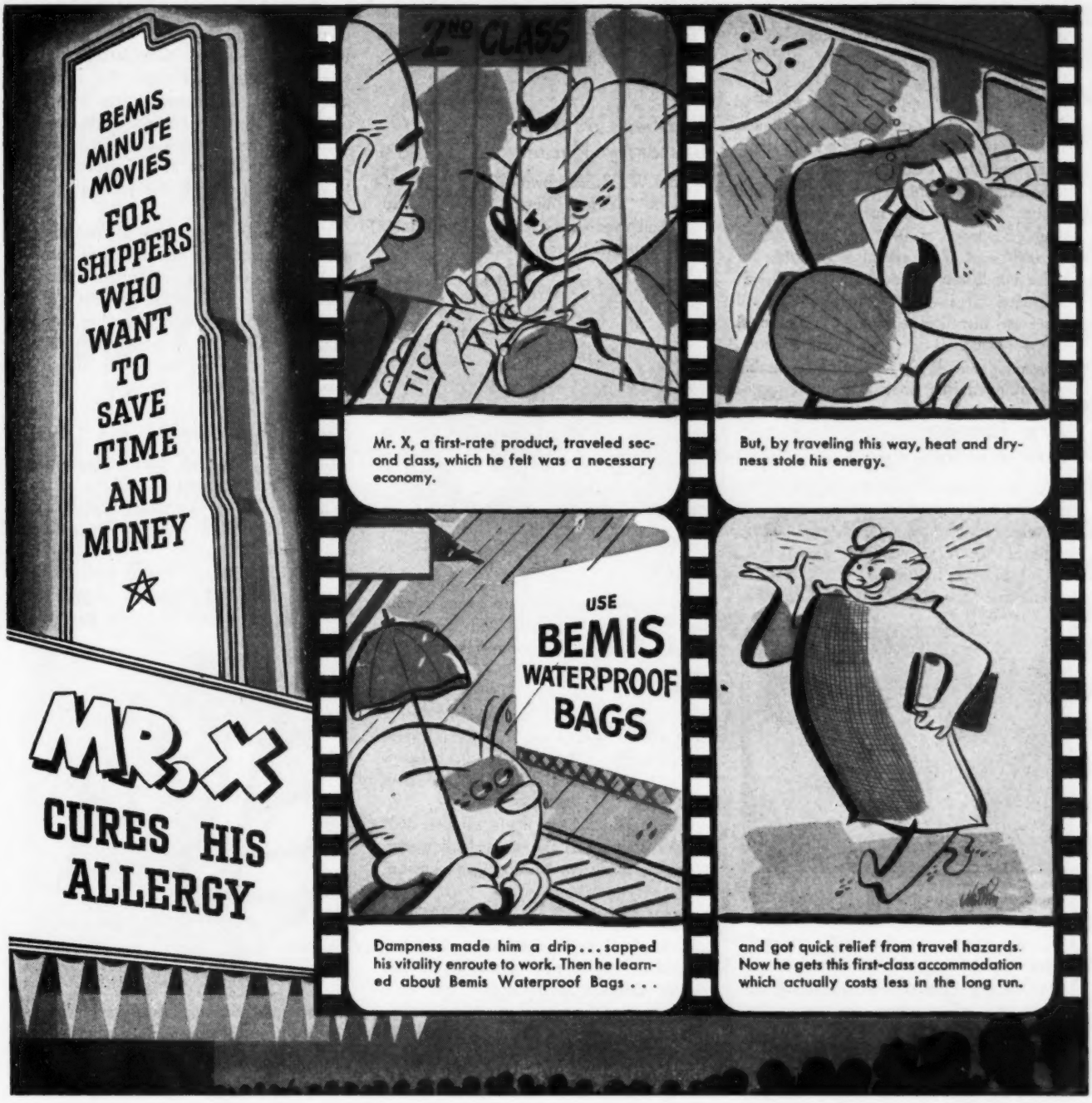


sheet. The two sheets are then spot welded together on about 1" centers, holding this adjustment permanently.

This staggered arrangement of the top and bottom holes is such that the edges of all holes in the top sheet are in very close proximity to the neighboring edges of holes in the bottom sheet. In effect, a passage for liquids is provided by each hole equivalent to the circumference of the hole times the distance between the two sheets. Liquids enter the holes of the upper sheet, turn at right angles to pass between the top and bottom sheets, turn again at right angles and pass out through the bottom holes. Solids are retained on the top sheet, either because they are too large to pass through the openings formed by this construction, or as a result of the formation of a filter bed on the top sheet whch in turn prevents the passage of the finer solids. The filter bed may be formed by the solids in the slurry, or, where the nature of the solids requires the use of filter aids, it is formed by the filter aid precoat. As there is very little overlapping of metal, there is little tendency for accumulation between sheets.

By whatever means the filter bed is formed, there is no embedding or bonding of the filter cake with the filter medium. Cake is readily removed by any suitable means, leaving the filter medium relatively clean. In most cases, by sluicing the active surface, Neva-Clog is made ready for another filtration cycle with most of its original filtration area available. If backwashing or blowback is involved, the same results are obtained.

Neva-Clog is stated to stand up longer under corrosive action than any other medium. A .002" loss in wire diameter would make a woven wire medium useless. The same loss from the surface of Neva-Clog would not affect filtration at all. Since the passages for the liquid



Bemis Waterproof Laminated Textile Bags are light in weight yet are the strongest shipping bags made. They are tested *before* they're put to work. *These pre-tests stop protests* . . . assure complete satisfaction.

If the exact Waterproof Bag you need doesn't exist, the Bemis Research Laboratory will design it for you. For prices and full information about these safe, economical packages, mail the coupon today.

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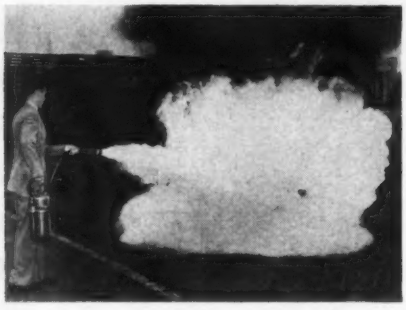
would be virtually unaffected, the only change would be in the thickness of the sheets, without undue loss in their strength.

Neva-Clog is supplied in any required form—flat, rolled or in special shapes. It is easily formed to fit any type of drum filter, cylinders, discs or other shapes. It is made of stainless steel, aluminum, bronze, steel or other metals in standard double thickness of .010" per sheet. Sheets of .008" and .005" are also available for those conditions where such thickness is adequate. It is readily adaptable to all types of filtration equipment, plate and frame, horizontal or vertical leaf, vacuum, pressure, etc. Where required, suitable gasketing can be provided.

Dry Powder Fire Extinguisher QB689

A dry chemical powder extinguisher designed for use against flammable liquid and electrical fires has been developed by engineers of Walter Kidde & Co.

The new extinguisher, made in 20-pound and 30-pound capacities, contains



a special dry powder mixture that will not pack or obstruct discharge. Convenient, one-hand operation with trigger-finger control is combined with overall light weight construction to make for speed and effectiveness in combatting Class B and C fires.

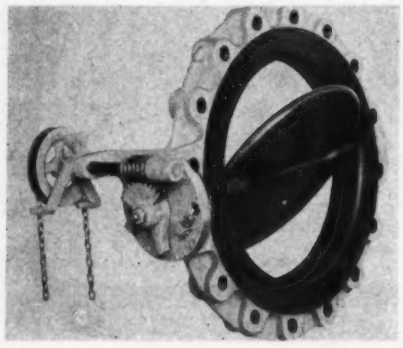
When the lock pin in the handle is removed and the trigger is pulled, the powder chamber is immediately pressurized by carbon dioxide released from the small cylinder mounted on the side. Simultaneously, the powder release valve in the top of the main powder chamber opens, discharging fine powder through the hose and nozzle in a stream that carries 20 feet or more. If the trigger is released before all the powder has been expelled, the pressure is maintained in both the carbon dioxide and powder chambers so that the extinguisher can be put into action again with no time lag.

Packless Valve QB690

A new 90 degree packless valve, Type B, of the bellows type is manufactured by Vacuum Electronic Engineering Co. Specifically designed for a minimum flow resistance in high vacuum service they are nevertheless compact. The ¾ inch unit shown measures only 1⅛" x 1⅛" x 3⅛" and has provision for solder connections. Pipe thread connections are also available. The valves are machined from square brass stock.

Rubber-Covered Butterfly Valve QB691

The W. S. Rockwell Co. has developed a "Wafer" butterfly valve with body and vane entirely covered with latex rubber, and with stem made of Hastelloy.



With the valve body "wafer"-thin to fit into close spaces between connecting pipe lines, and with a smooth body and vane interior, there is minimum resistance to flow.

The valve illustrated here is 16" pipe size with chain wheel control. Other sizes range from 4" to 72", designed as standard for operating pressures below 25 psi, but can be designed for pressures to 100 psi.

The vane has been made to turn 360° if tight shut-off is not needed; however, it can be made for wedge-tight shut-off.

Spray Dryer QB692

Spray drying equipment of well known Danish design is now available in this country through Niro Corp.

Outstanding feature of the Niro method is the atomizer head. This is a specially designed, high-speed rotary head, which ejects the liquid product as a mist into the drying chamber. Circulating hot air seizes the mist as it enters the chamber and instantaneously evaporates its water content. The dry content falls to the bottom of the chamber as a fine powder and is funnelled out as a finished, easily soluble product ready for packaging and sale.

The atomizer produces a consistently uniform powder and the drying is accomplished at a temperature so low that the original properties of the product are in no way impaired. An outstanding feature of this equipment is its ability to produce powders with very high bulk densities when it is required.

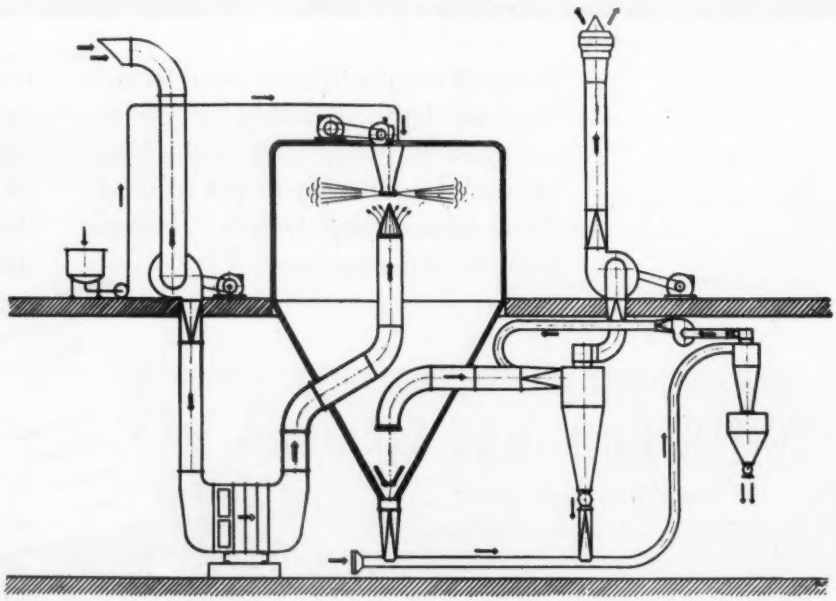
Bubbler Meter QB693

Gas or liquid purge rates are measured in familiar flow units (i.e., cu. ft. per hour of air or gph of water) by the new purge service flowmeter of the Fischer & Porter Co.

The "Bubbler type" purge meter is an adaptation of the Flowrator instrument that includes a built-in needle valve for

close control of purge rates. It covers the range of measurement generally ac-

Niro Spray Dryer



If 35 Years of Chemico Experience

could be blueprinted

. . . it would show a continuous record of new and improved processes for the recovery and production of sulfuric acid and production of synthetic nitric acid, ammonia and other heavy chemicals.

Starting from a small group of specialists late in 1914, the Chemico organization soon became the leading designer and constructor of acid plants in the United States. In the following years, Chemico extended its activities to other industrial countries strategically located throughout the world. And in 1934 the technical staff of the Nitrogen Engineering Corporation, leading experts in Nitrogen Fixation, merged with this organization.

Chemico now enjoys an international reputation in the field of chemical plant design. The superiority of its acid and ammonia plants is recognized throughout the world. Whether your acid or other heavy chemical requirements are small or large, it will pay you to take advantage of the 35-years' experience of the Chemico organization.

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Synthetic Ammonia
Synthetic Methanol
Double Superphosphate
Ammonium Phosphate
Ammonium Sulfate
Ammonium Nitrate
Calcium Nitrate

PLANTS FOR PRODUCTION, CONCENTRATION AND RECOVERY OF

Hydrochloric Acid • Phosphoric Acid
Nitric Acid • Sulfuric Acid

COMPLETE REFINERY ACID PLANTS
COMPLETE FERTILIZER PLANTS
AMMONIA OXIDATION UNITS
ORE ROASTERS
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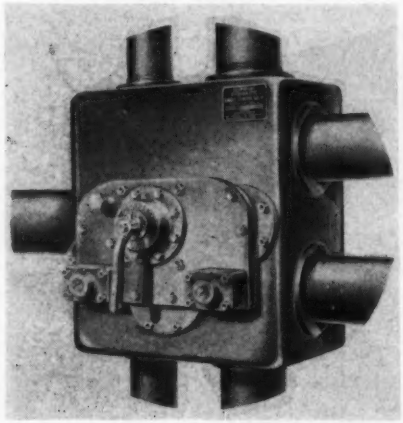
CC-176

cepted as standard for bubbler installations. The unit consists simply of a Pyrex or stainless steel ball-shaped float, a precision-bore Pyrex metering tube and a die-cast body which houses the needle-type control valve.

Control Valve QB694

A single control valve for all types of zeolite softeners, ion exchange systems and pressure filters promises to reduce time required, and minimize the possibility of faulty operation in manipulation. With the new Cochrane Hydromatic valve, all



necessary operations are accommodated by means of a single valve.

The new valve is, in effect, a six-position valve, with four normal operating positions and two standby positions.

In the control of zeolite systems, for example, the four operating positions provide separate control of backwash, regenerant feed, rinse and service, permitting great flexibility, so that separate flow rates may be assigned to each operation, unaffected by the requirements for other phases of operation.

Two standby positions are accommodated by the Hydromatic valve: in one, the container being serviced by the valve is completely isolated from service lines; in the second the container may be drained to bed level for inspection.

The Hydromatic valve is pilot-actuated, power for operation of the valve members being provided by the raw water itself.

Stainless Steel Flexible Hose QB695

The new Finnflex stainless steel flexible hose is especially designed to convey

liquids, acids chemicals, steam, air and gases at high temperatures and high pressures. It is a heavy wall, helically corrugated, corrosion resistant, non-magnetic hose of one piece construction with exceptional heat and high fatigue resistance. The hose is capable of withstanding temperatures up to 1600° F and burst pressures up to 14,000 psi.

It can be bent freely without damage or distortion to a diameter of from 4" to 36", depending upon the size. The hose is obtainable in sizes from ¼" to 3" ID, and is supplied in stainless steel Nos. 304, 347, or 316. Couplings or flanges of either carbon or stainless steel are available.

Furnace Atmosphere Indicator QB696

Charles Engelhard, Inc., has developed a new instrument to indicate the relative oxidizing or reducing conditions of the atmosphere within a furnace.

In this new instrument, the gases are continuously analyzed in such a way that a complete record or indication of the furnace conditions during an entire run, is furnished automatically on a suitable electrical indicator or recorder. The instrument does not require any adjustments once put into use. The normal furnace controls are operated in the usual manner. When the results prove ideal, the reading of the Engelhard indicator then establishes the correct operating point at which subsequent heats can be duplicated. If a more oxidizing or more reducing atmosphere is desired, the operator is guided by the furnace atmosphere indicator in setting the furnace controls. The indicator

what's back of a purer soap?

In selecting soap, the demand is for purity, cleaning and sudsing power, non-irritation, and low cost. To meet these requirements, soap manufacture must be efficient, precise, and economical. That's why leaders in the industry insure proper filtration by specifying the Sperry Plate Filter Press.

What are some of the advantages offered by the Plate Filter Press? It produces maximum clarity . . . the driest cake, it's easily made of acid or alkali resistant material, yet the initial and maintenance costs are low. These are but a few of many reasons why it is the most widely used filter today.

Let a Sperry engineer diagnose *your* filtration problem, whatever your product. Sperry's facilities and experience are available to you without cost.

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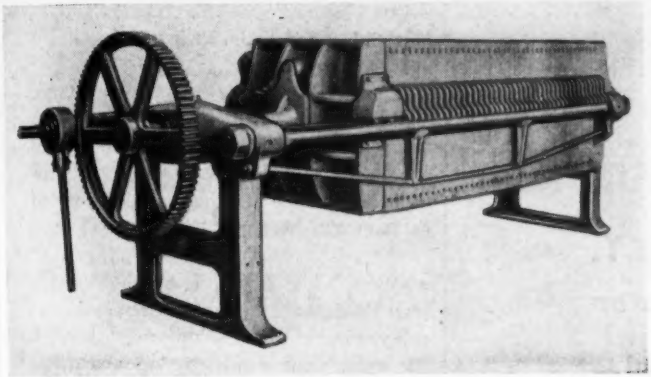


SPERRY FILTER PRESSES

will show the direction of the atmospheric change within a furnace in a positive manner.

The indicator scale is graduated for 0 to 25 and is entirely arbitrary. Once the operator or metallurgical department establishes the ideal conditions the indicator always shows the correct operating point and permits reproduction of results.

High Accuracy Mercury Manometer QB697

A new type of mercury manometer, Model 1500, has been designed and built by the Taylor Instrument Cos. The new manometer can operate at 1500 psi working pressure and is available in ranges of 10-400" of water. It is built for use on indicating, recording or controlling instruments and two manometers can be mounted on a single case for recording two flows or ratio flow control.

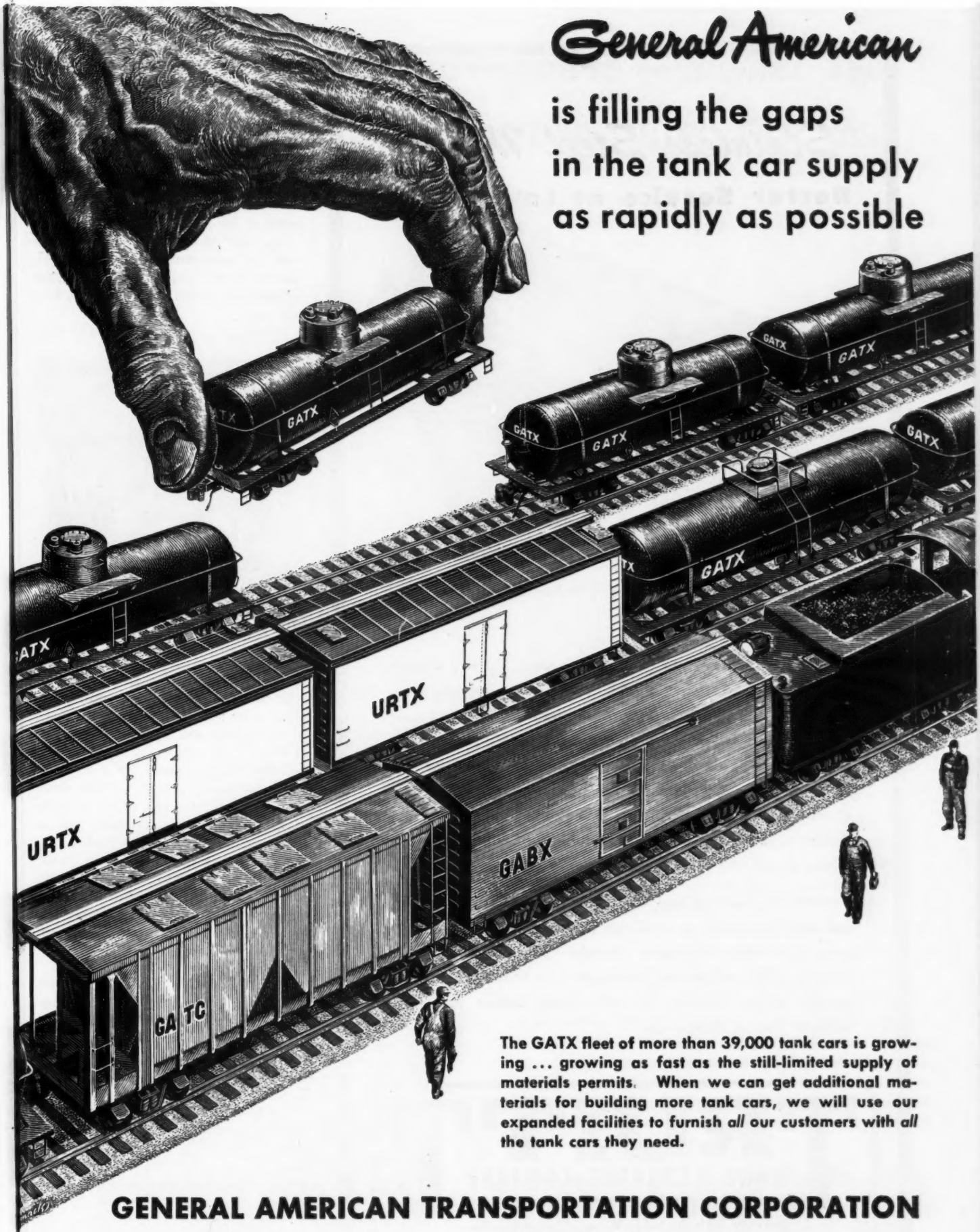
A few outstanding features include: (1) Greater energy output which is made possible by the use of a large diameter float and long float travel. (2) Specially designed Pressure Tight Bearing of stainless steel with Teflon bearing surfaces. (3) Positive Overrange Protection is provided with positive-acting, non-sticking check valves submerged in mercury. (4) Leakless damping adjustment under full-rated pressure is assured with an uniquely designed damping device. (5) Interchangeable range chambers contribute to the adaptability of the new manometer which gives continuous ranges from 10 to 533" of water. No piping changes are necessary when changing from one range to another.

● QB698 The new *electronic load control* of G. C. Wilson & Co. is for use with all motor-operated processes such as pul-

verizers, pumps, and extruders. It maintains a constant motor load by regulating the input feed. Variable time delays and a variable dead zone are incorporated to eliminate hunting and to insure operation at maximum output.

One model suitable for motors of all ratings, is provided. Flexitrol employs two identical radio type vacuum tubes and operates from 115 volts, 60 cycles. Equipment is available in either explosion-proof or standard sheet metal housings.

● QB699 The Ernest *valve* of Wright-Hall Products, Inc., permits the passing of pulpy, viscous or acid mixtures through the cylindrical inside passage clear of



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is filling the gaps in the tank car supply as rapidly as possible

The GATX fleet of more than 39,000 tank cars is growing ... growing as fast as the still-limited supply of materials permits. When we can get additional materials for building more tank cars, we will use our expanded facilities to furnish *all* our customers with *all* the tank cars they need.

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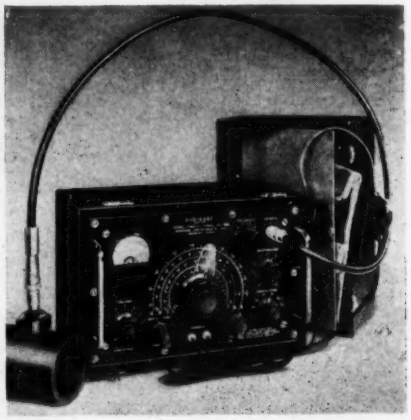
all obstructions and change of cross-section. The opening action is instant and it is self-closing, dripless and protects the solutions from metallic contamination. A quick hand release gives access to the one working part when cleaning is required.

• QB700 A new model of the "Audigage" *thickness detector* has recently been introduced by Branson Instruments, Inc.

The new Model FMSS-5 detector is used for non-destructive thickness measurement of steel, copper, aluminum, glass, unfilled plastics and other materials, from one side.

"Audigage" has an X-cut quartz crys-



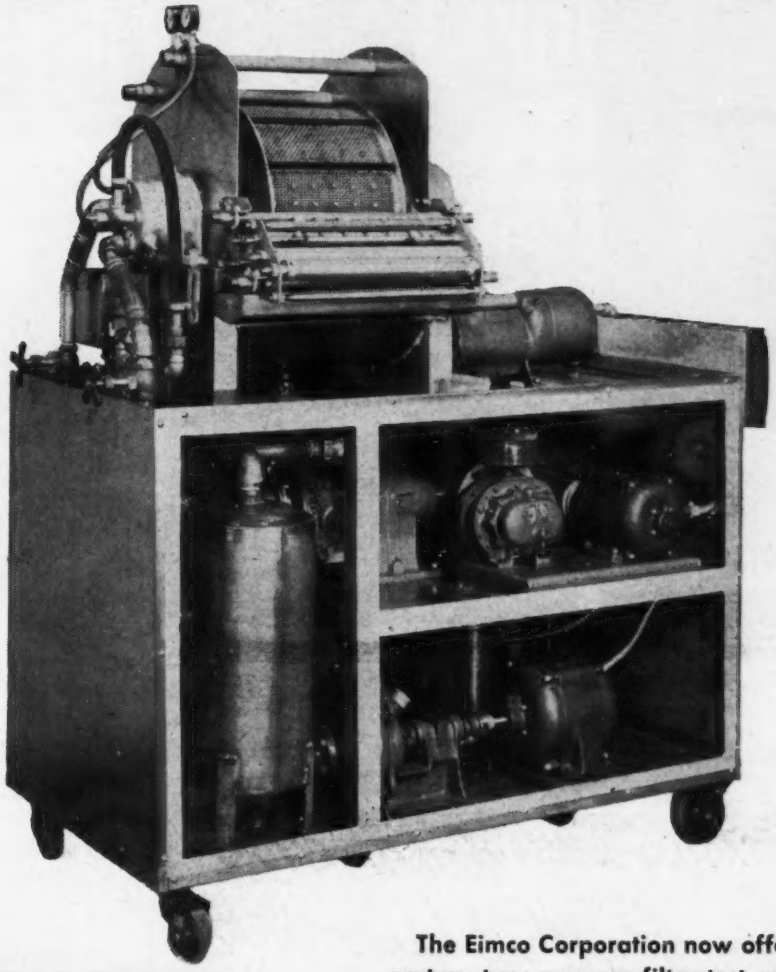
tal in the gage head, powered by an electronic oscillator, which generates ultrasonic waves for transmission into the material under test. The instrument is tuned to a frequency which produces resonance in the unknown thickness. Resonance is indicated simultaneously by a milliammeter and headphones, to provide either visual or audible signals. The frequency at which resonance is indicated can be converted to thickness by use of a conversion scale on the instrument panel. The thickness reading obtained by this method is the actual wall thickness of the material, directly under the crystal; backup liquids or scale deposits are not measured.

• QB701 Non - sparking, non - corrosive *blind flanges* weighing 80% less than bronze are available from the Gatke Corp. These flanges are made of fabric materials, moulded to finished dimensions under heat and pressure. The flanges have been tested at 400 pounds live pressure.

The flanges do not spark when struck by metal, stone or other material. The material withstands 15 to 20% sulphuric acid solutions. They are available for 3, 4, 5, 6 and 8 inch pipe. Can be furnished to specifications on quantity orders.

• QB702 Plumber Krak-Stik, produced by Lake Chem. Co., is a positive seal for repairing split soil pipes, sandholes, cracked pipes, and gaskets, etc. All that is required is to rub the stick of *pipe mending cement* heavily over any crack

At Last a complete—mobile—cabinet type laboratory vacuum filter test unit



Available in either Drum or Disc type units. Made in stainless steel, monel, duriron and other materials. Provides proportional data for estimating production size Eimco Filters. Available on rental basis.

The Eimco Corporation now offers its new laboratory type vacuum filter test unit for use with either cloth or cords as filter media.

This unit is on rollers and can be easily moved about the plant or laboratory to facilitate testing of filterable materials.

The Lab unit is completely assembled with all necessary equipment such as: vacuum pump, blower, receivers, filtrate pumps, piping, motors, electrical wiring, switch panel and makes a complete self-contained unit for your laboratory work.

The Eimco Laboratory Unit is available on a rental basis for your test work.

Write for more information on Eimco Laboratory Units.

EIMCO

THE EIMCO CORPORATION

The World's Largest Manufacturers of Underground Rock Loading Machines

EXECUTIVE OFFICES AND FACTORIES — SALT LAKE CITY 8, UTAH, U. S. A.

BRANCHES: NEW YORK, CHICAGO, BIRMINGHAM, EL PASO, SACRAMENTO, MANILA

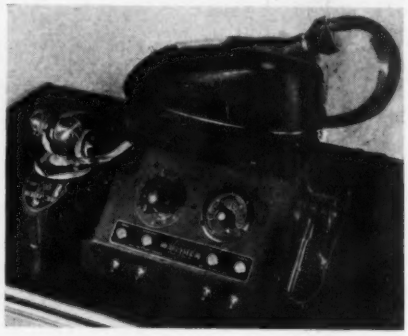
AFFILIATED COMPANIES: SOCIETE EIMCO, PARIS, FRANCE
EIMCO (GREAT BRITAIN) LTD., LEEDS 12, ENGLAND
AGENTS IN ALL PRINCIPAL CITIES THROUGHOUT THE WORLD

3183

or leak. Pipe surfaces do not have to be prepared for application of Plumber Krak-Stik.

LABORATORY EQUIPMENT

• LE105 Model No. 100-109 is a new *abrasion testing set* in the Taber line of standard rub-wear abrasion testers in-



corporating their unique rotary abrading action on a 4" specimen. The wear results from alternately rubbing the flat faces of two resilient Calibrase wheels over the surface being tested. A range of standardized abrasive wheels are available for testing all types of surface finishes.

New features include improved suction pump with vertical dust receiver with swinging nozzle fully adjustable for any thickness specimen.

• LE106 Three helpful advantages have been built into Alnor *Dewpointer* by Illinois Testing Labs. to provide even greater operational dependability in measuring dew point.

First, the monometer scale has been made longer to increase the ease and accuracy of reading. Second, thermopiles now measure the temperature inside the observation chamber. Third, the resistance thermometer tells when the temperature of the gas sample has stabilized to the temperature of the fog chamber.

• LE107 An entirely *automatic immersion heater* with adjustable thermostat control has been introduced by the Still-Man Co.

An integral part of the instrument is an adjustable thermostat control that maintains any desired temperature to ±1°F. A safety cut-out prevents overheating when out of solution.

Five immersion lengths, 5", 8", 10", 15", and 20" are available in acid resisting stainless steel. The units are rated at 1000 watts and plug into any standard 110 volt AC outlet.

New Equipment Index Volume LXII, June-December, 1948

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Alnico 5 88
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(A Quick Quiz on modern pH advancements)

Do you know these important facts about BECKMAN pH CONTROL?

Do you know...

That Beckman pioneered modern glass electrode pH equipment?

Until Beckman pH instruments were developed, glass electrode pH equipment was a cumbersome, complicated laboratory curiosity. It was Beckman that pioneered today's simple, compact, highly accurate and completely dependable glass electrode pH equipment!

That Beckman pioneered virtually every major development in modern glass electrode pH equipment?

Such far-reaching advancements as the High pH Glass Electrode . . . the High Temperature Glass Electrode . . . the Unusually Rugged "X-9" Glass Electrode . . . as well as a wide range of other vitally important advancements in glass electrode pH instrumentation, were *all* pioneered by Beckman. *Many of these advancements are still available exclusively in Beckman equipment!*

That Beckman offers the industry's most complete line of glass electrode pH instruments?

Included in the complete Beckman line are instruments specially designed to combine the high precision and wide versatility necessary for advanced research, medical and laboratory applications . . . others that combine maximum simplicity and high accuracy with complete portability for plant and field applications . . . still others that combine maximum simplicity and high accuracy with the plug-in convenience of full AC operation . . . plus *completely automatic* pH equipment for continuous pH indication, recording and control on large-scale processing applications.

That Beckman also provides the industry's most complete line of modern glass electrodes?

Although glass electrode pH instruments are the most efficient pH equipment obtainable, no glass electrode pH instrument is better than the versatility, accuracy and dependability of the electrode assemblies available for use with it.

Beckman provides the industry's most complete line of glass electrodes for use with Beckman pH instruments—a type of electrode assembly to meet every industrial, research, laboratory and field requirement!

That there are so many money-saving applications for Beckman pH control that you may be losing important profits unless you make a complete investigation of your operations?

There is pH wherever there's water, water solutions, moist pastes, sludges, slurries or other moisture-containing substances. And wherever there is pH, chances are the operation can be done better . . . with greater uniformity and less waste at lower overall cost . . . by Beckman-controlling the pH of the various processing operations.

WHETHER *you manufacture food products or treat sewage . . . do metal plating or refine crude oil . . . make textiles or process ore — in fact, no matter* WHAT *your field of operation . . . if you have not yet determined whether Beckman pH Control can be used to advantage in your operations — possibly is already* BEING *used to cut costs by your competitors — let us study your processes and make helpful recommendations. No obligation, of course.* BECKMAN INSTRUMENTS, NATIONAL TECHNICAL LABORATORIES, SOUTH PASADENA, 17, CALIFORNIA.

BECKMAN

For an informative, non-technical outline of modern pH control — what it is and how it's used — send for this free booklet "What Every Executive Should Know About pH."

INSTRUMENTS CONTROL MODERN INDUSTRIES

pH Meters and Electrodes — Spectrophotometers — Radiation Meters — Special Analytical Instruments

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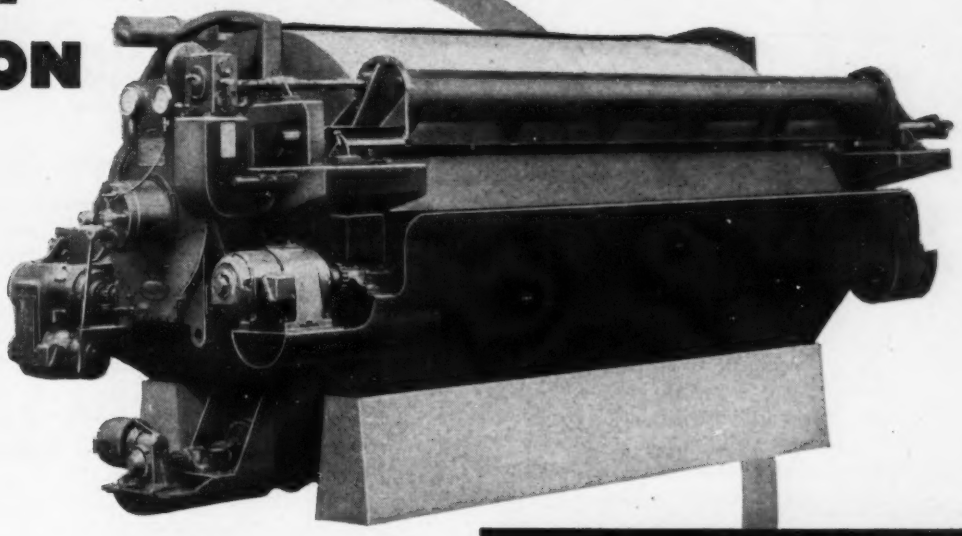
OLIVER "PRECOAT" FILTRATION

Often the Best for "Hard-to-Filter" Solutions



*Solutions with Sticky Solids

*Solutions with Small Amounts of Solids

*Solutions requiring High Polish

We're talking now about continuous vacuum filtration in contrast to batch pressure filtration which, until recently, had to be used on all such solutions. Today, the story is different. Today, by means of the Oliver Precoat Filter, continuous vacuum filtration can be used on most "difficult-to-filter" solutions... and to great advantage.

If you are handling such solutions on batch pressure filters with their attendant heavy manual handling and general messiness, investigate the Oliver Precoat Filter and its possibilities for helping to reduce your filtering costs.

The way the Precoat Filter works is briefly this: first a thick cake of a pervious filter medium or precoat is built up on the drum (taking an hour or two); then the solution to be filtered is fed into the tank or vat while keeping the drum rotating and the vacuum on. The thin film of solids forming on the surface is shaved off continuously, always leaving a fresh surface of precoat for further cake deposition. In this way the cake never gets thick enough to retard or stop the flow of filtrate. That's why the Oliver Precoat can handle those "difficult-to-filter" solutions. Actual filtering cycles last from several days to several weeks continuous operation, depending upon how much precoat has to be removed each revolution.

OLIVER UNITED FILTERS INC.

New York 18, N. Y.
33 West 42nd Street

San Francisco 11,
California

Chicago 1, Ill.
221 N. LaSalle Street

Western Sales Division
Oakland 1, California
2900 Glascock Street

Sales and Manufacturing Representative:
E. Long Limited
Orillia, Canada

Factories: Oakland, Calif. • Hazleton, Pa. • Orillia, Canada • Melbourne, Australia

PACKAGING & SHIPPING

by T. PAT CALLAHAN

Set Date for Packaging Exposition

The American Management Association's 18th annual National Packaging Exposition, largest in the history of the event, will be held May 10-13, 1949, in the Public Auditorium at Atlantic City, N. J. More than 200 exhibitors will utilize 110,000 square feet to display developments in packaging, packing and shipping machinery, equipment, materials, design and services which are used in the manufacture and distribution of virtually every product in the nation's commerce.

The annual four-day AMA Conference on Packaging, Packing and Shipping will also be held in the Auditorium concurrent with the Exposition. More than a thousand packaging executives, engineers and technical experts will discuss the management aspects of materials, methods, procedures and merchandising.

New Fibre Drum Plant To Start Production

Continental Can Co.'s new fibre drum plant, located on a 45-acre plot in Tonawanda, N. Y., is scheduled to start production of Leverpak shipping drums shortly. This new plant is purposely designed for the exclusive manufacture of these fibre drums which are distinguished by their fast closing, re-opening and reclosing features.

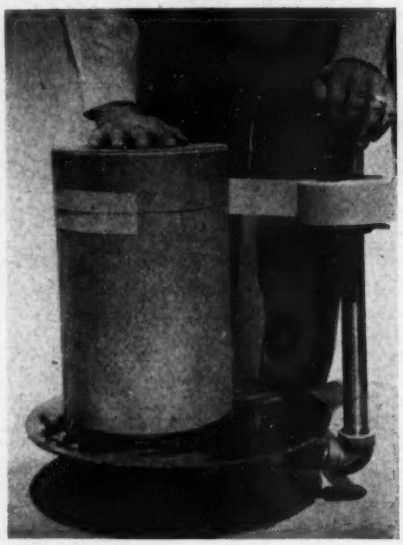
The design of this modern one-story building of approximately 200,000 square feet of floor space, provides for machinery arrangement, power conveyors and enclosed unloading and loading docks to effect the greatest possible manufacturing economy from the receiving of raw materials to the loading of freight cars with the finished product.

This is the third Continental plant devoted exclusively to the manufacture of fibre shipping drums. The other two, both of which are operated by The Container Co., a Continental subsidiary, are located in Van Wert, Ohio, and Reading, Pa. A fourth now under construction in St. Louis County, Mo., is scheduled for production about February 1, 1949.

New Machine Applies Pressure Tape

A new semi-automatic machine for applying standard pressure (masking) tape to drums, roll goods, canisters, and cartons on a production basis, has been introduced by the Lake Laboratories Co., Clifton Heights, Pa. Under actual tests, it has reduced the manual tape sealing time by as much as 400 per cent.

The Lake Tape-Sealing Machine has



only one moving part. Packages up to 17″ diameter are placed between adjustable spring clamps. One complete hand revolution of a swivel arm feeds the tape evenly and neatly to the package. The tape is cut by a blade. The swivel arm is available in any height (length) up to 28″ and is mounted in an oilless bearing. Maintenance costs are nil. Unit weighs 40 lbs., and sells for $42 50 f. o. b. factory.

Goodrich to Offer Rubber Lining Service

Rubber lining of storage tanks, tank cars, pipe lines and other equipment is to be added to production activities at the Tuscaloosa, Ala. plant of The B. F. Goodrich Co. Construction of the building to house the new operation will begin at once. It will be erected near the company's tire and tube plant and will contain about 7,200 square feet of floor space.

The chemical industry and industries making wide use of chemicals in their operation are the principal users of the rubber lining service. The lining prevents chemical reactions which cause contamination of acids stored or transported in metal vessels.

Most of the rubber lining work will be done at the Tuscaloosa plant. However, some of the larger jobs may require Goodrich personnel to do the lining "on location."

Manufacturers Elect New Officers

The Packaging Machinery Manufacturers' Institute at its sixteenth annual meeting held recently at the Roosevelt Hotel, New York, elected the following officers: *president,* H. Kirke Becker, Peters Machinery Co., Chicago, Ill; and *vice-presidents,* John P. Corley, Miller Wrapping & Sealing Machine Co., Chicago, Ill., and Edward G. Kuhn, Consolidated Packaging Machinery Corp., Buffalo, N. Y. H. L. Stratton is secretary-treasurer of the Institute which has offices at 342 Madison, New York City. George W. von Hofe, New Jersey Machine Corp., retiring president, remains on the board of directors as an ex-officio member.

Two New MCA Publications

The Manufacturing Chemists' Association has published Chemical Safety Data Sheet SD-26 on Phosphorus Oxychloride, the twenty-sixth in the series of chemical product safety manuals being prepared by them. Designed for supervisory staffs and management, the manuals concisely present essential information for the safe handling and use of chemical products.

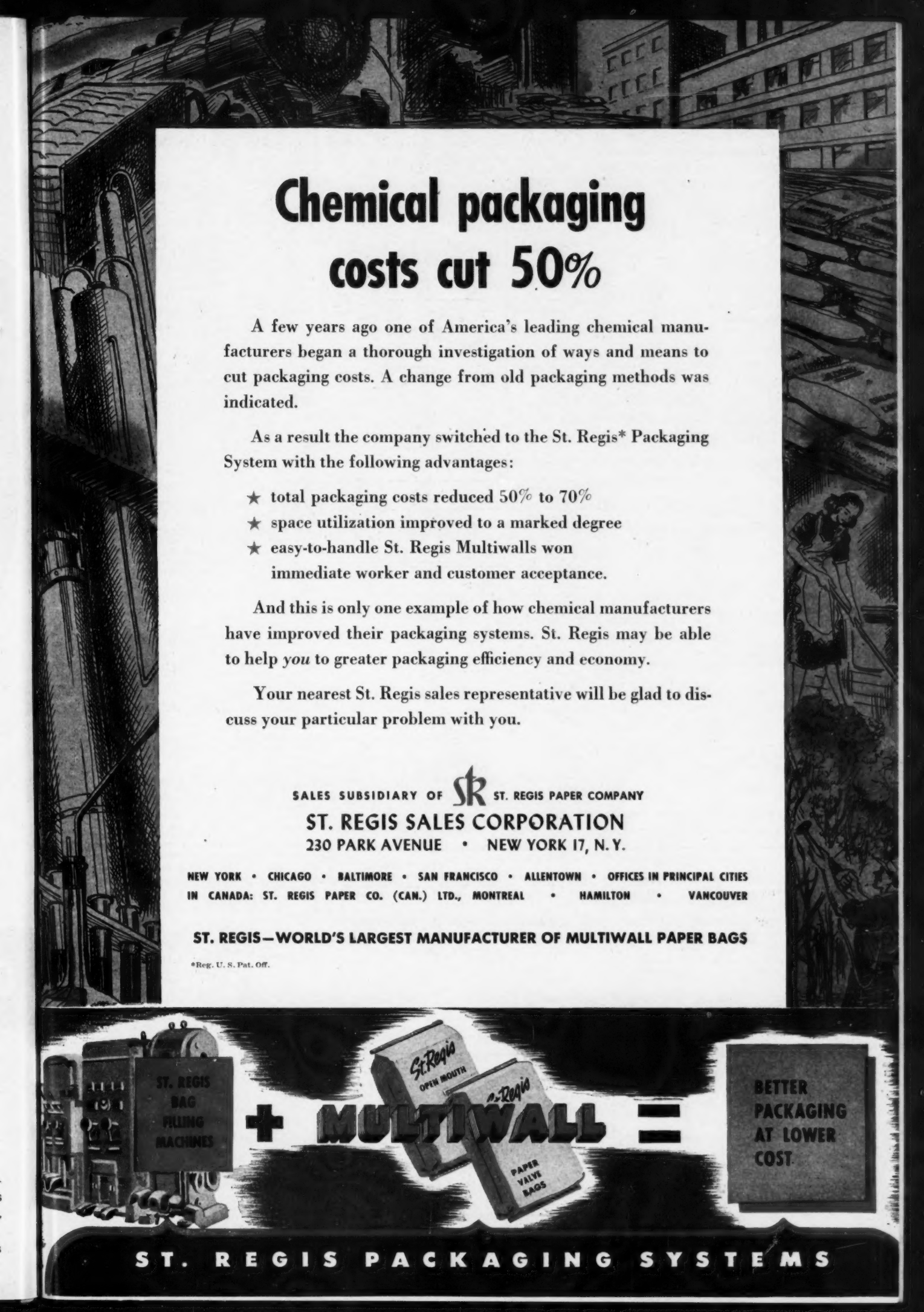
Another recent publication is Manual Sheet H-10 covering the handling and discharge of containers for Hydrofluoric Acid, both aqueous and anhydrous. This comprehensive 22-page manual replaces previous Manual Sheets H-1, H-2, and TC-5, contains 8 illustrations, and is intended to supplement M.C.A. Chemical Safety Data Sheet SD-25.

Subject matter of the newly published manual on HF includes description of product; general precautions, including complete data on hazards, first aid and medical treatment; materials of construction, including piping, valves and fittings; detailed container practice for aqueous acid, including rubber drums, steel drums (lined and unlined), lead carboys, tank cars and tank trucks; instructions for handling and unloading cylinders of anhydrous acid, including detailed information on emptying the cylinder and introduction of acid into process, both as a liquid and as a gas; and recommendations on tank car unloading practice using compressed air or pump.

Copies of Chemical Data Sheet SD-26 and Manual Sheet H-10 may be obtained at 20 and 25 cents per copy, respectively, from the Manufacturing Chemists' Association, 246 Woodward Building, Washington 5, D. C.

ICC Regulations Amended

The Regulations for the Transportation of Explosives and Other Dangerous Articles were amended on October 19,



Chemical packaging costs cut 50%

A few years ago one of America's leading chemical manufacturers began a thorough investigation of ways and means to cut packaging costs. A change from old packaging methods was indicated.

As a result the company switched to the St. Regis* Packaging System with the following advantages:

- ★ total packaging costs reduced 50% to 70%
- ★ space utilization improved to a marked degree
- ★ easy-to-handle St. Regis Multiwalls won immediate worker and customer acceptance.

And this is only one example of how chemical manufacturers have improved their packaging systems. St. Regis may be able to help *you* to greater packaging efficiency and economy.

Your nearest St. Regis sales representative will be glad to discuss your particular problem with you.

SALES SUBSIDIARY OF SR ST. REGIS PAPER COMPANY

ST. REGIS SALES CORPORATION

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ST. REGIS—WORLD'S LARGEST MANUFACTURER OF MULTIWALL PAPER BAGS

*Reg. U. S. Pat. Off.

ST. REGIS PACKAGING SYSTEMS

1948. Following are the particular phases of the amendments which effect the chemical industry:

The commodity list, section 4, has been amended by the addition of the following articles which have not heretofore been specifically classified in the regulations:

Article	Classed as—	Exemptions and packing (See sec.)	Label required if not exempt	Maximum quantity in one outside container by rail express
(Add) Amyl trichlorosilane	Cor. L.	No exemption, 249B	White	10 gallons
(Add) Butyl trichlorosilane	Cor. L.	No exemption, 249B	White	10 gallons
(Add) Carbon dioxide-nitrous oxide mixture	Noninf. G	302, 303	Green	300 pounds
(Add) Chemical kits	See sec. 253B			
(Add) Cumene hydroperoxide	Oxy. M.	153(b), 186D	Yellow	1 quart
(Add) Cyanogen chloride containing less than 0.9 percent water	Pois. A.	No exemption, 334	Poison Gas	Not accepted
(Add) Diethyl dichlorosilane	Cor. L.	No exemption, 249B	White	10 gallons
(Add) Diphenyl dichlorosilane	Cor. L.	No exemption, 249B	White	10 gallons
(Add) Ethyl phenyl dichlorosilane	Cor. L.	No exemption, 249B	White	10 gallons
(Add) Hexyl trichlorosilane	Cor. L.	No exemption, 249B	White	10 gallons
(Add) High explosives, liquid	Expl. A.	No exemption, 61 (j)		Not accepted
(Add) Hypochlorite solutions containing more than 7 percent available chlorine by weight	Cor. L	No exemption, 277	White	4 gallons
(Add) Octyl trichlorosilane	Cor. L.	No exemption, 249B	White	10 gallons
(Add) Parathion and compressed gas mixture	Pois. A.	No exemption, 331A	Poison Gas	Not accepted
(Add) Phenyl trichlorosilane	Cor. L.	No exemption, 249B	White	10 gallons
(Add) Propyl trichlorosilane	Cor. L.	No exemption, 249B	White	10 gallons

The following articles have been changed:

Article	Classed as —	Exemptions and packing (See sec.)	Label required if not exempt	Maximum quantity in one outside container by rail express
(Change) Hexaethyl tetraphosphate and compressed gas mixture	Pois. A.	No exemption, 331A	Poison Gas	Not accepted
(Change) *Nitroglycerin liquid, desensitized*	See sec. 50(d) and 61(a) (5)			
(Change) Tetraethyl pyrophosphate and compressed gas mixture	Pois. A.	No exemption, 331A	Poison Gas	Not accepted
(Change) Trichlorosilane	Inf. L.	No exemption, *109B*	Red	10 gallons

The reason for the above additions and changes is to provide for transportation of new articles.

The following amendments to the regulations are effected by this order:

Section 23 (*Closures for containers*):
23 CLOSURES FOR CONTAINERS
Containers must be closed for shipment as prescribed in the specifications for the container unless otherwise authorized for the particular article being shipped. Gasketed closures must be fitted with gaskets of efficient material which will not be deteriorated by the contents of the container.

The reason for this change is clarification.

Section 109A (*Ethyl trichlorosilane*):
109A (a) Ethyl trichlorosilane must be packed in specification containers as follows:
(b) Spec. 15A or 16B.—Wooden boxes with glass inside containers not over 1 gallon capacity each securely closed and cushioned with incombustible absorbent material.
(c) Spec. 17H or 37D.—Metal drums (single-trip) with glass inside containers not over 1 gallon capacity each securely closed and cushioned with incombustible absorbent material.
(d) Spec. 5A.—Metal drums not over 55 gallons capacity.
(e) Spec. 5F.—Metal drums not over 11 gallons capacity.
(f) Specification cylinders as prescribed for any compressed gas, except acetylene.

The reason for this amendment is to provide additional packages for this material.

Add Section 109B:
109B (a) Trichlorosilane must be packed in specification containers as follows:
(b) Spec. 15A or 16B.—Wooden boxes with glass inside containers not over 1 quart capacity each securely closed and cushioned with incombustible absorbent material.
(c) Spec. 17H or 37D.—Metal drums (single-trip) with glass inside containers not over 1 quart capacity each securely closed and cushioned with incombustible absorbent material.
(d) Spec. 5A.—Metal drums not over 55 gallons capacity. This container not authorized for shipment by rail express.
(e) Spec. 5F.—Metal drums not over 11 gallons capacity. This container not authorized for shipment by rail express.
(f) Specification cylinders as prescribed for any compressed gas, except acetylene.

The reason for this addition is that it is necessitated by the change in requirements for ethyl trichlorosilane in section 109A.

Section 163 (*Chlorate of soda, chlorate of potash, etc.*):
(Add) (h) Chlorate of soda is authorized for shipment in tank cars, spec. 103. Cars must be thoroughly cleaned before loading.

The reason for this amendment is to provide for the transportation of chlorate of soda dry in tank cars.

Section 186A (a) (*Liquid peroxides*):
186A (a) Liquid peroxides other than acetyl peroxide solution, hydrogen peroxide, peracetic acid and cumene hydroperoxide must be packed in specification containers as follows:

The reason for this amendment is clarification.

186A (*Liquid peroxides*):
(Add) (f) Spec. 17C or 17E.—Metal drums (single-trip) not over 15 gallons capacity. Authorized only for material which will not react dangerously with the drum metal, or be decomposed by contact with it.

The reason for this amendment is to provide containers for the shipment of liquid peroxides.

186D (Add) (a) Cumene hydroperoxide of strength not exceeding 75 percent in a non-volatile solvent must be packed in specification containers as follows:
(b) Spec. 15A, 15B, 15C, 16A or 19A.—Wooden boxes with inside containers which must be: Glass or earthenware, not over 1 gallon each, cushioned with incombustible packing material in sufficient quantity to absorb the contents of the inner container.
(c) Spec. 17E.—Metal drums (single-trip) with interiors so treated that they will be resistant to the contents.

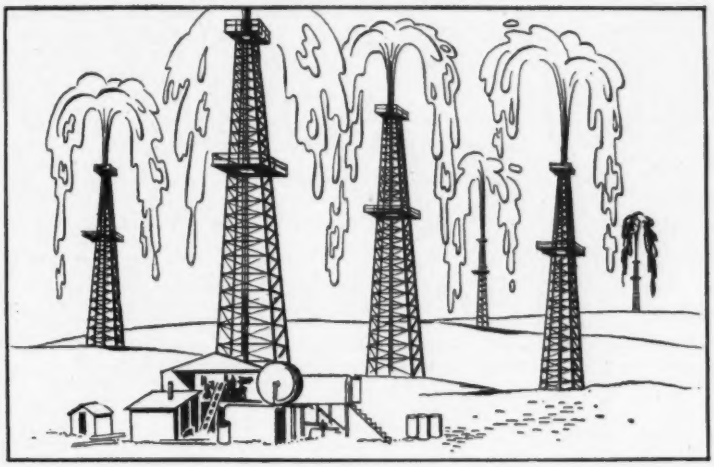
The reason for this amendment is to provide for the transportation of a material not heretofore shipped commercially.

Section 245 (*Not exempted articles*):
(Add) (bb) Amyl trichlorosilane
" (cc) Butyl trichlorosilane
" (dd) Diethyl dichlorosilane
" (ee) Diphenyl dichlorosilane
" (ff) Ethyl phenyl dichlorosilane
" (gg) Hexyl trichlorosilane
" (hh) Octyl trichlorosilane
" (ii) Phenyl trichlorosilane
" (jj) Propyl trichlorosilane
" (kk) Hypochlorite solutions containing more than 7 percent available chlorine by weight.

The reason for this amendment is to place these materials in the list of not exempted articles.

Section 249B (*Add*) (a) Amyl trichlorosilane, butyl trichlorosilane, diethyl dichlorosilane, diphenyl dichlorosilane, ethyl phenyl dichlorosilane, hexyl trichlorosilane, octyl trichlorosilane, phenyl trichlorosilane, and propyl trichlorosilane must be packed in specification containers as follows:
(b) Spec. 15A or 16B.—Wooden boxes with glass inside containers not over 1 gallon capacity each securely closed and cushioned with incombustible absorbent material.
(c) Spec. 17H or 37D.—Metal drums

Why this...



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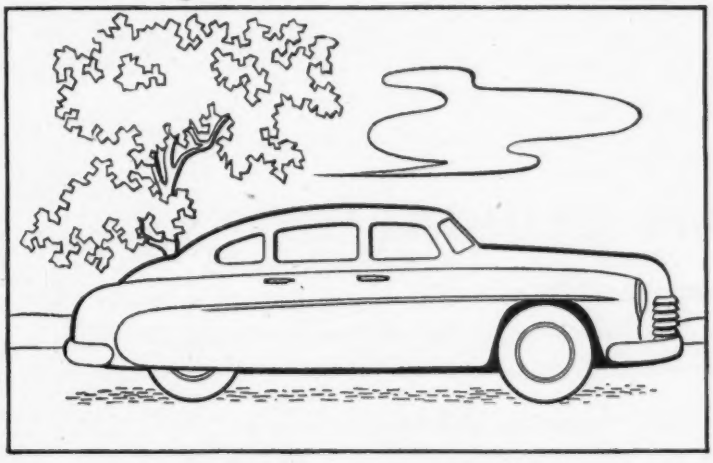

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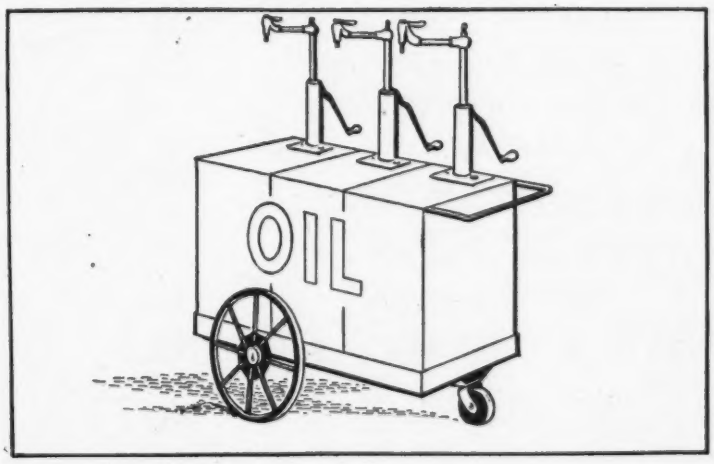

ALMOST 30½ MILLION passenger cars were manufactured between 1932 and 1946.

In 1932, motorists bought close to 258 million barrels of motor oil. In 1941, motorists bought almost *twice* this much.

Hats off to the automobile and oil industries which made this dramatic progress possible!

Yet—believe it or not—there was a packaging problem in 1932 which, when solved, speeded up this progress.

The problem was to put oil in individual containers, sealed at the refinery, which maintained brand identity at point-of-sale . . . which were clean and easy to handle and open . . . and which could be nationally advertised to the ultimate consumer—the car-owner.

That problem was solved by the "Refinery Sealed" container . . . another Canco "first."

This is just one more example of how Canco-engineered packages have brought a product to more people more conveniently.

Can we do the same for your product?

AMERICAN CAN COMPANY

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This trademark CANCO *is your assurance of quality containers. Look for it!*

(single-trip) with glass inside containers not over 1 gallon capacity each securely closed and cushioned with incombustible absorbent material.

(d) Spec. 5A.—Metal drums not over 55 gallons capacity.

(e) Spec. 5F.—Metal drums not over 11 gallons capacity.

(f) Spec. 5, 5B, 5C and 17E (single-trip).—Metal drums—These containers not authorized for shipments by rail express.

(g) Specification cylinders as prescribed for any compressed gas, except acetylene.

The reason for this amendment is to provide for the shipment of new materials not heretofore specifically listed in the regulations.

Section 253 (e) (*Chloracetyl chloride*): (e) Spec. 1A, 1C, or 1D.—Carboys in boxes or kegs. Use of these containers will be permitted because of the present emergency and until further order of the Commission.

The reason for this amendment is to provide additional ICC ID carboys for the shipment of this material.

(*Add*) 253B (a) Chemical kits, except as otherwise provided herein, must be packed, marked and labeled as prescribed by these regulations for the specific acids or corrosive liquids contained therein.

(b)(1) Chemical kits containing acids in inside containers not exceeding 6 fluid ounces capacity each and complying with all of the following requirements, are exempt from specification packing, marking, other than name of contents, and labeling requirements for transportation by rail freight, rail express, highway or water:

(b)(2) The kit must not contain any of the items named in section 245.

(b)(3) The kit must be a strong wooden or metal container, or must be packed in a strong wooden or metal container.

(b)(4) The acids or corrosive liquids must be cushioned with sufficient absorbent cushioning material to completely absorb the contents of the individual containers, and must be protected from injury by other materials in the kit.

(b)(5) The contents of the kit must be of such nature and/or so packed that there will be no possibility of the mixture of contents causing dangerous evolution of heat or gas.

The reason for this amendment is to provide for shipment of soil test kits and similar kits containing small quantities of the less dangerous acids and corrosive liquids.

Section 303 (k) (*Restrictions for gases named in table*): (*Add*)

Kind of Gas	Maximum permitted filling density (See sec. 303(h)).	Cylinders* marked as shown in this column must be used except as provided in note 1 and sec. 303(p) (2) to 303(p) (6).
(Add)	Percent	
Carbon dioxide-nitrous oxide mixture (See Note 3)	68	ICC-3A1800; ICC-3
(Change)		
Vinyl methyl ether, inhibited (See Note 7)	68	ICC-4B300, without brazed seams; ICC-4BA, without brazed seams; ICC-3A300; ICC-3B300; ICC-25

* This table permits cylinders of lower service pressure for the shipment of these materials. These cylinders are considered to be adequate for transportation.

Amend first paragraph of Note 3, section 303 (k), as follows:

Note 3.—The maximum amount of liquefied carbon dioxide, nitrous oxide, or carbon dioxide-nitrous oxide mixture, with 1 pound allowable variation in each cylinder, must not be over 20 pounds for standard cylinders 5½ inches in diameter by 51 inches long, nor over 50 pounds for standard cylinders 8½ inches in diameter by 51 inches long and larger: Provided, that cylinders having interior diameter not over 10 inches, walls not less than ⅜ inch thick, and capacity not less than 4,200 cubic inches, may be shipped by or for the United States Government when charged with not over 102 pounds of gas.

The reason for this amendment is to provide specific requirements for a new commodity and to provide additional container for vinyl methyl ether, inhibited.

Section 272 (g)(1) (*Sulfuric acid*): (g)(1) Spec. 17F.—Metal barrels or drums (single-trip) only for acid of 1.7059 specific gravity (60° Baume tolerance plus .2° Baume); or acid of greater strength with or without inhibitor, provided such acid has a corrosive effect on steel measured at 100° F. no greater than 66° Baume commercial sulfuric acid. Drums equipped with vented closures of an experimental type approved by the Bureau of Explosives are also authorized for export shipments.

The reason for this amendment is to provide for shipments of drums equipped with vented closures of an experimental type which have proven satisfactory in laboratory and limited service tests.

(*Add*) 277 (a) Hypochlorite solutions containing more than 7 per cent available chlorine by weight must be packed in specification containers as follows:

(b) Spec. 15A, 15B, 15C, or 12B.—

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AT HIGH SPEEDS!

Your packaging time drops sharply when you're operating with a BAGPAKER.® Picture the savings from a machine that closes up to 15 heavy-duty multiwall paper bags per minute—a rugged long-lasting machine, too! And there's more than enough strength in a tough BAGPAKER closure. It's made with the "cushion stitch", which absorbs strains and won't pull out.

Check the features of both BAGPAKER models shown at the right. One provides high speed, dependable closing; the other, in addition, gives a closure that resists moisture and is proof against contamination and sifting.

You're apt to discover more profitable closing and handling methods . . . more efficient multiwall bag uses, by discussing your needs with a BAGPAK engineer.

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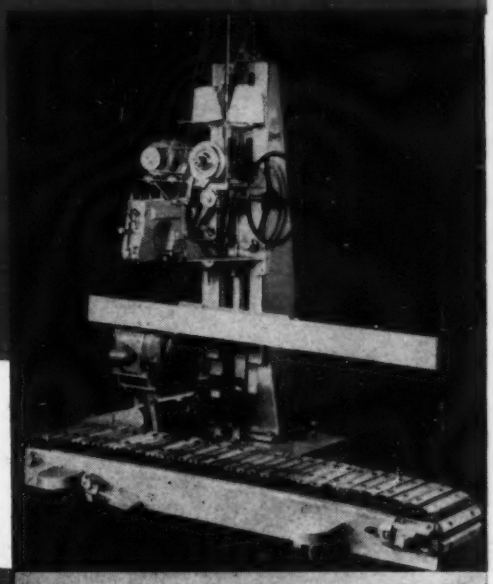
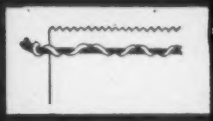
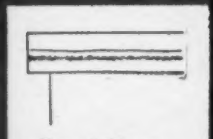
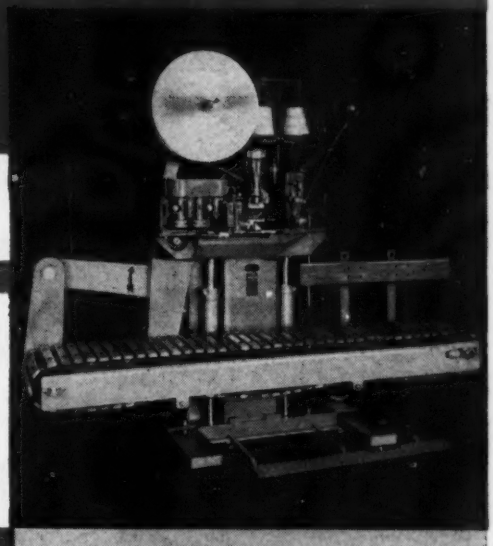


MODEL "E 1" (portable)—closes up to 15 bags per minute. A single foot pedal controls both conveyor and sewing head. Handles both paper and textile bags.





Taped Closure (Model "DA")—it's moisture-resistant, sift-proof, tough



MODEL "DA" (portable) applies tape over "cushion stitch", making a tight seal. One operator, filling and closing, can handle 2 to 4 bags a minute . . . 6 to 12 where filled bags are delivered to BAGPAKER conveyor. Sewing operation starts and stops automatically—no tape wasted.

BAGPAK DIVISION

INTERNATIONAL PAPER COMPANY, Bagpak Division • 220 East 42nd Street, New York 17

Branch Offices: *Atlanta, Baltimore, Boston, Chicago, Cleveland, Baxter Springs, Kans., Los Angeles, New Orleans, Philadelphia, Pittsburgh, St. Louis, Syracuse.*
In Canada: *Continental Paper Products, Ltd., Montreal, Ottawa.*

Wooden or fiberboard boxes with glass or earthenware inside containers of not more than 1 gallon capacity each. Packages must not weigh over 65 pounds gross nor contain more than 4 such inside containers if their capacity is greater than 5 pints each.

(c) Spec. 1A, 1C, or 1D.—Carboys in boxes or kegs.

(d) Closures for inside containers and carboys must be vented and must be of a material resistant to the lading and capable of preventing leakage of liquid contents.

(e) Containers of 5 gallons capacity and over in service for transportation of this material prior to September 1, 1948, of a design and venting arrangement approved by the Bureau of Explosives, may be continued in use until further order of the Commission.

(f) Glass or earthenware containers of not more than 4 fluid ounces capacity each, packed in strong outside containers, and cushioned with absorbent material in sufficient quantity to completely absorb liquid contents in the event of breakage, are exempt from specification packaging, marking, and labeling requirements for transportation by rail freight, rail express, or highway. When for transportation by carrier by water they are exempt from specification packaging, marking other than name of contents and labeling requirements.

The reason for this amendment is to provide specific requirements for a material not previously regulated.

The list included in section 326 (a) has been increased by the addition of cyanogen chloride containing less than 0.9 per cent water.

The reason for this is to provide for the shipment in commercial quantities of cyanogen chloride containing less than 0.9 percent water.

Section 331A (a)(1) (*Hexaethyl tetraphosphate, etc.*):

(a)(1) Hexaethyl tetraphosphate, parathion, and tetraethyl pyrophosphate mixtures with compressed gas, containing not more than 10 percent by weight of hexaethyl tetraphosphate, parathion or tetraethyl pyrophosphate must be packed in specification containers as follows:

The reason for this amendment is to provide for the shipment of a new material.

Section 339 (c) (*Aniline oil*):

(c) Spec. 5, 5A, or 5B metal barrels or drums; Spec. 17C single-trip metal drums; Spec. 17E single-trip metal drums not over 5 gallons capacity each. Net weight in 110-gallon drums should not exceed 915 pounds; gaskets not less than one-eighth inch thick must be used at bung and filling holes and must be made of hard fiber impregnated with glycerin, or of metal-covered cork, or of impregnated asbestos sheets, or metal-covered asbestos; filled drums must be so placed that bungs will be subjected to hydrostatic head of oil contained therein for a period of not less than 12 hours; the exterior of filled drums must be carefully examined for evidence of aniline oil, any traces of which must be removed by washing off with water or, preferably, weak acetic acid; the space between rolling hoops immediately around the bung should be painted, to aid in the detection of leaks at this point; drums showing no signs of leakage only may be shipped; all returnable drums must bear the following returnable container notice, shellacked to head of drum near consignee's name and address:

Prevent damage to foodstuffs, or other freight. Drain this drum thoroughly, tightening bungs securely in place with gaskets, before returning. If necessary, use new gaskets. Aniline oil stains on the outside of drums should be washed off with water or, preferably, weak acetic acid.

Metal barrels or drums under this paragraph must not have openings exceeding 2.3 inches in diameter.

The reason for this amendment is to provide additional containers for aniline oil.

Section 367 (c) (*Radioactive material such as ores, residues, etc.*):

(c) Radioactive materials such as ores, residues, etc., of low activity packed in strong tight containers are exempt from specification packing and labeling requirements for shipment in carload lots by rail freight provided the gamma radiation or

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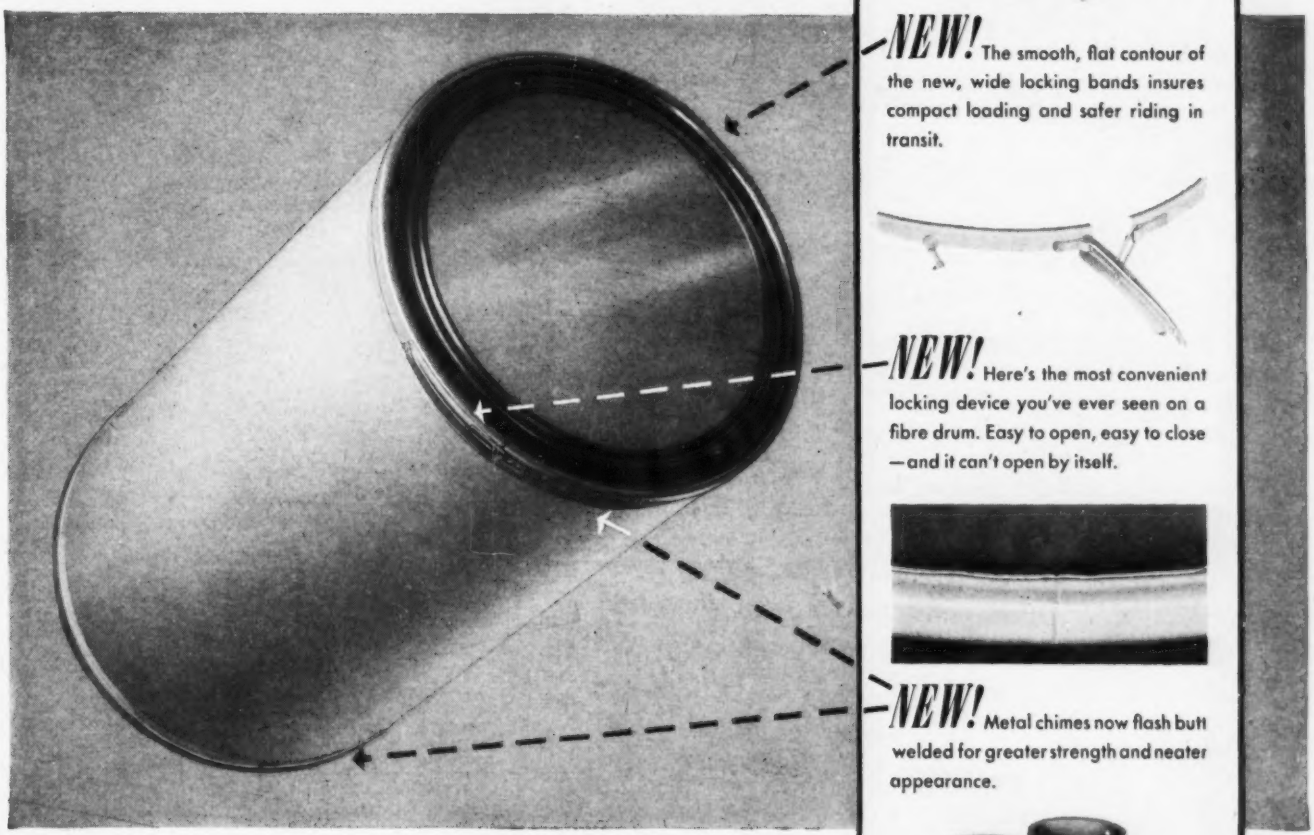
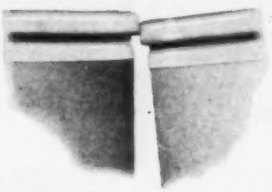
LEVERPAK DRUM

with "flat contour" locking band for better stowing and shipping.





NEW! The smooth, flat contour of the new, wide locking bands insures compact loading and safer riding in transit.

NEW! Here's the most convenient locking device you've ever seen on a fibre drum. Easy to open, easy to close—and it can't open by itself.

NEW! Metal chimes now flash butt welded for greater strength and neater appearance.

NEW! Advances all along the line—improved materials, processes, techniques and equipment.

Here is the best-looking, most serviceable fibre shipping drum we have ever produced. From its newly designed cover—secured by the new "flat contour" locking band—to its easy stacking base, the improved Leverpak drum is engineered for rugged use and re-use.

If you have a dry product to ship, the improved Leverpak is the drum to ship it in—for greater product protection, easier handling, better appearance and all around efficiency. May we send you the full details on the Leverpak drum and its shipping mates, the all-fibre Fiberpak drum and the re-designed metal-end Stapak drum? A postal card will bring you the full story without obligation.

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equivalent will not exceed 10 milliroentgens per hour at a distance of 12 feet from any surface of the car and that the gamma radiation or equivalent will not exceed 10 milliroentgens per hour at a distance of 5 feet from either end surface of the car. There must be no loose radioactive material in the car, and the shipment must be braced so as to prevent leakage or shift of lading under conditions normally incident to transportation. The car must be placarded by the shipper as provided in section 541A and 552 of these regulations. Shipments must be loaded by consignor and unloaded by consignee.

The reason for this amendment is to provide practical safe means of shipping radioactive ores and residues.

Section 402 (p)(1) (*Labels and markings*):

(p)(1) Labels and marking name of contents are not required on carload or truckload quantities of dangerous articles, except class A, class C or class D poisons, by rail freight, rail express or highway, when such shipments are unloaded by the consignee or his duly authorized agent from the car or motor vehicle in which originally loaded.

The purpose for this amendment is clarification.

Specification ICC 10B has been amended providing alternate hoops of equal efficiency in the construction of the barrel. The complete specification as promulgated by the Commission should be consulted in order to determine what the alternates are.

Amendments to Specification 13 and 13A have also been made in order to clarify requirements for periodic testing of these containers.

Specification 23F, Par. 19(a) (*Flap closures*):

19 (a) Flap closures.—Flaps must butt or have full overlap excepting that inner flaps overlapping ½ inch are permitted.

The reason for this amendment is to provide for this construction in boxes divided lengthwise by the lining tubes.

Specification 23G, par. 13 (c) (*Completed containers*):

(c) Three loaded samples to be tested. Each must withstand side to side pressure of at least 500 pounds without deflection of over ½ inch; except that for boxes with fluted crimped ends the deflection shall not exceed ¾ inch; speed of compression tester to be ½ inch per minute plus ¼ inch minus ¼ inch per minute.

The purpose of this amendment is to allow for the fact that fluted crimped ends on these containers settle approximately ¼" before actual deflection begins to register on compression tester.

Section 567 (d):

(*Add*) (d) Any car which has contained radioactive material must be thoroughly cleaned by the consignee in such a manner as to remove all radioactive material from the car, and a certificate to this effect must be furnished the local agent of the railway company before the car is released to the carrier.

The purpose of this amendment is clarification of the regulations.

New Handbook for Gummed Tape Users

A 64-page book, entitled *Gummed Tape User's Handbook*, by Mills W. Waggoner, has just been published by Better Packages, Inc., Shelton, Conn., as a comprehensive guide to more efficient selection, moistening, and application of gummed tape and the care of tape machines.

The handbook is available at 50 cents from Better Packages, Inc., Shelton, Conn., or from any of the company's regional distributors.

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Acetic Acid
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PLANT OPERATIONS NOTEBOOK

Check List for the Small Solvent User

Accident records suggest that trouble with solvents arises more frequently where these chemicals are used only occasionally or in comparatively small quantities. The reason seems to be the unfamiliarity of the small user with the need for precautions or with the measures to take.

Because even a single instance of careless or improper handling of a solvent during operations may result in a fire or sickness, or both, the following points should be checked:

1. *What does the label say?*

Many solvent containers are labeled with recommendations for safe use. If the label has no such information, the manufacturer or packager may be of assistance in providing safe handling data. When smaller cans or bottles are filled in the shop from larger containers, the smaller containers should also be clearly labeled.

2. *Are solvent containers kept closed?*

Self-closing safety cans are useful when containers must be opened frequently. Open pails are unsafe for storing solvents.

3. *Is there plenty of ventilation whenever a solvent is used?*

Any solvent operation, unless it is carried out in entirely enclosed equipment, may give off dangerous quantities of vapor. Depending upon the operation, open windows, mechanical ventilation or gas masks may be the best way to protect workers. Where a solvent is used frequently, even in small quantities, mechanical ventilation is probably essential.

4. *Is there a noticeable odor of solvent in the workroom?*

The absence of solvent odor does not always indicate that the air is safe. However, a noticeable odor generally means that there is too much vapor in the air, even for fairly short operations.

5. *Are workers' hands being soaked in solvent?*

Whenever solvent may wet the skin frequently or for conslderable periods of time, protective gloves of a solvent-resistant material should be worn to prevent dermatitis.

6. *Are workers trained to be good "housekeepers"?*

Solvents should be handled to avoid spilling, and solvent-soaked waste and rags should be disposed of in airtight containers.

7. *Are solvent operations well supervised?*

The plant manager or owner must often be his own safety director, to make certain that workers handle the solvent according to instructions and use gloves, gas masks or other safety equipment provided.

8. *Are the men who work with solvents in good health?*

Those who work with solvents should report stomach upset, dizziness or other illness to a physician, since these may be symptoms of exposure to solvent vapors. Alcoholics and those suffering from certain organic illnesses should not work with solvents.

Maintenance Program for Heat Insulation

To provide maximum insulating value, all heat insulation requires a regular inspection and maintenance program. The steps, as outlined by the Magnesia Insulation Mfrs. Assoc., are:

1. Periodic inspection to see that all sources of heat loss, such as new sections of piping, are insulated
2. Periodic evaluation of insulation thickness, since changes in operations or fuel costs may necessitate an increase in thickness.
3. Survey of insulation jacketing to check for adequate protection against weather, mechanical, or chemical damage. Scorched spots are thoroughly investigated, since they may indicate a crack or failure in the insulation underneath, or may be a sign that the insulation is too thin.
4. Check of the insulation for loosening. If due to excessive vibration of the insulated equipment, the cause of vibration is eliminated, if possible, and the insulation is re-applied and tightened. Joints are pointed up with cement and the canvas or other jacketing replaced and securely sealed. If the vibration cannot be eliminated or reduced, another method of application may be necessary.
5. Examination for dents or cracks. Dents may be caused by mechanical abuse of insulation, such as erection of scaffolding, etc. The damaged section is cut out and a new one of the same size and shape is wired on securely. The cracks are filled with insulating cement and the protective jacketing is replaced.
6. Check after repairs of equipment due to difficulties such as water hammer and leaks, which may have damaged the insulation.
7. Survey of insulation after disasters such as fires and floods. Lines or

equipment on which insulation has been saturated by water should be brought up to full temperature slowly to prevent too rapid formation of steam between the hot surface and the insulation.

NOMOGRAPH-OF-THE-MONTH

Edited by DALE S. DAVIS

Readers are invited to submit for publication in this department any original nomographs pertaining to chemistry or engineering. $10 *will be paid for each one used.*

Nomograph for Determination of the Water-Vapor Content of Natural Gas

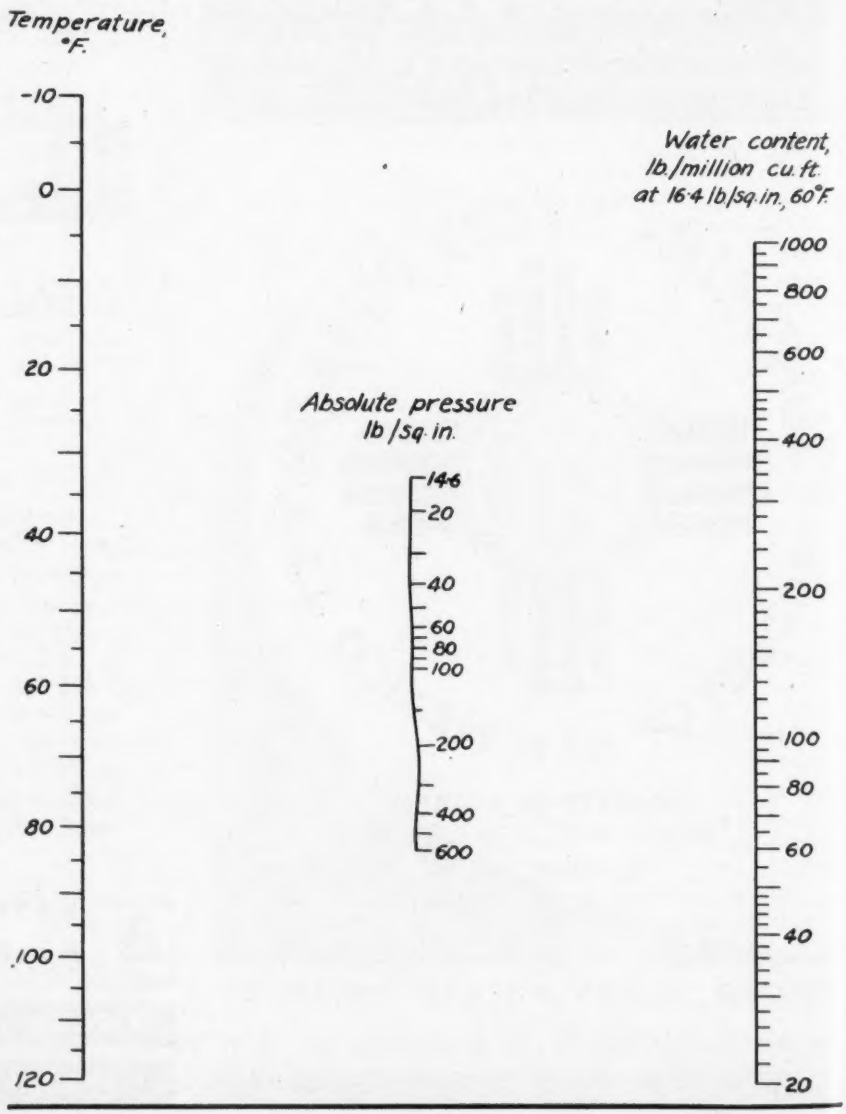
by **D. S. DAVIS**
Government Laboratories
University of Akron
Akron, Ohio

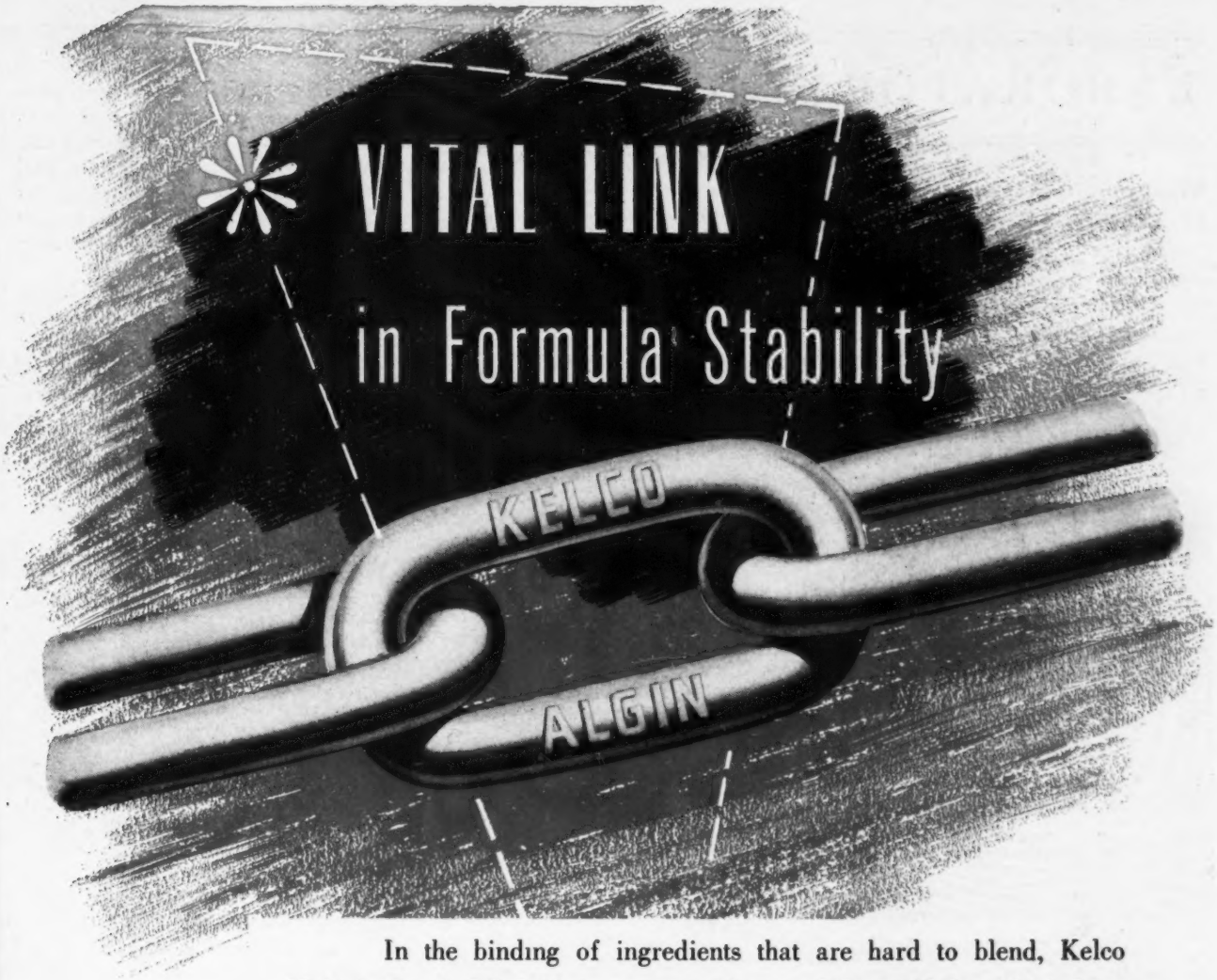
SPECIFIC data on the moisture carrying capacity of natural gas are not always available. In such instances the engineer may estimate water vapor content by means of the accompanying line coordinate chart prepared from recent information[1] by methods described previously.[2]

The use of the chart is illustrated as follows: What is the water vapor content of natural gas at 50° F. under an absolute pressure of 90 pounds per square inch? Connect 50 on the temperature scale with 90 on the pressure scale and note the intersecton with water content scale at 115 pounds of water per million cubic feet of gas measured at 16.4 pounds per square inch and 60° F.

Literature Cited

[1] Amero, R. C., Moore, J. W. and Capell, R. G., Chem. Eng. Progress, *43*, 349 (1947).
[2] Davis, D. S., "Empirical Equations and Nomography," Chap. IX, New York, McGraw-Hill Book Company, 1943.





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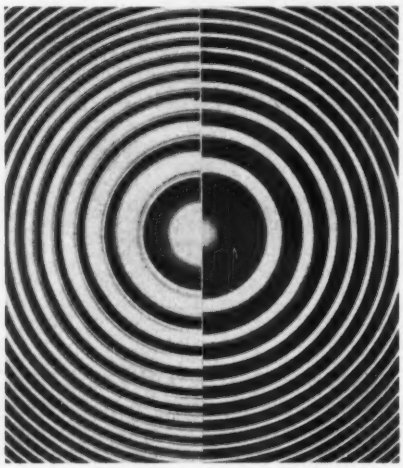
LABORATORY NOTEBOOK

New Primary Standard of Length?

The wavelength of the green radiation of mercury isotope 198, produced via neutron bombardment in an atomic pile, provides a new and better standard of length. From the interference fringes (natural mercury at the left and mercury 198 at the right) Dr. W. F. Meggers of the National Bureau of Standards has measured the wavelength of the green radiation with an accuracy of one part in a hundred million. An accuracy of one part in a billion is theoretically possible.



The Bureau has presented it for consideration as the world's primary standard of length at the International Conference of Weights and Measures in Paris.

X-Ray Microscope

Dr. Paul H. Kirkpatrick, Stanford University, has operated the first x-ray microscope. It is hoped that this eventually will provide scientists with a new tool for the examination of minute objects not readily penetrated by light or electrons. Its resolving power is expected to be somewhere between that of the best type of optical microscope and the electron microscope. While the new device will not have the magnifying power of the electron microscope, it will offer the advantage that living specimens can be examined. The largest magnification which has been achieved with early models is about 60 diameters, although no attempt has been made to get high magnification. It is hoped that fully developed models will permit scientists to x-ray objects less than a millionth of an inch in size. This is about 20 times smaller than can be seen with an optical microscope. Development of the first x-ray microscope model climaxed a year's research financed by the Research Corp.

An x-ray microscope had long been considered an impossibility because x-rays show almost no refraction, and because of the impossibility of reflecting them except at a very low angle.

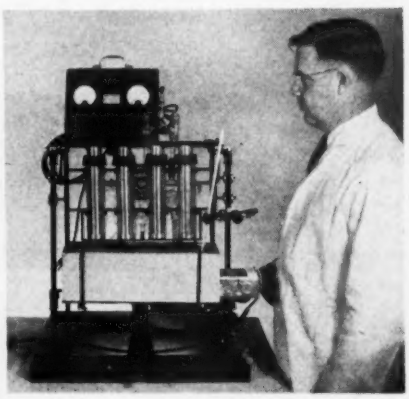
In operation the x-ray is bounced off one vertical mirror to another horizontal reflector. One mirror brings the x-rays together on a horizontal plane; the second brings them together on a vertical plane. The mirrors, about the size of a ten cent piece, look flat but are actually concave, representing a tiny segment of a theoretical curve with a radius of about 30 feet.

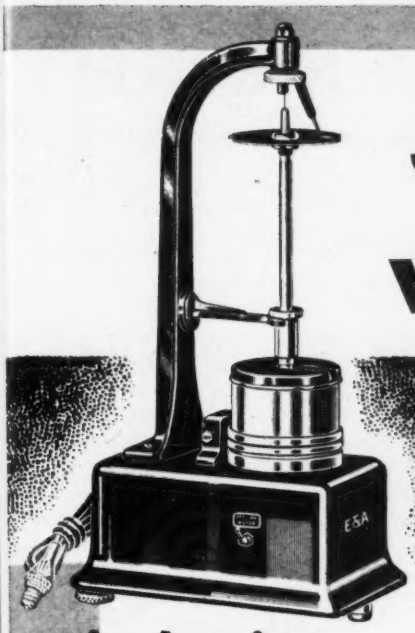
To date the scientists have used platinum, iridium, gold and various metal alloys as coating for the mirrors. An alloy of nickel and platinum gives the best results so far. They have also taken successful x-ray microscope pictures of a wire so fine that it cannot be seen with the naked eye in ordinary light.

Semi-Micro Molecular Distillation

Molecular distillation for semi-micro analyses may be carried out on several samples simultaneously in a still now being manufactured by Distillation Products, Inc., Rochester 13, N. Y. Operating under high vacuum to pressures as low as 1 x 10^{-5} mm of mercury, the stills are used to separate heat-sensitive substances of high molecular weight. Samples are loaded into each still unit which are then immersed into an oil bath held at distilling temperature by electrical heaters which are controlled through a resistor. The distillate collects on the condenser, which is removed to obtain the fraction after each distillation. Samples may range from a few milligrams to a gram in each still unit.

This analytical still was made for use in D. P. I.'s Biochemistry Department to separate vitamin E from oils extracted from foods and other biological materials. Added uses in the organic chemistry departments warranted further production.





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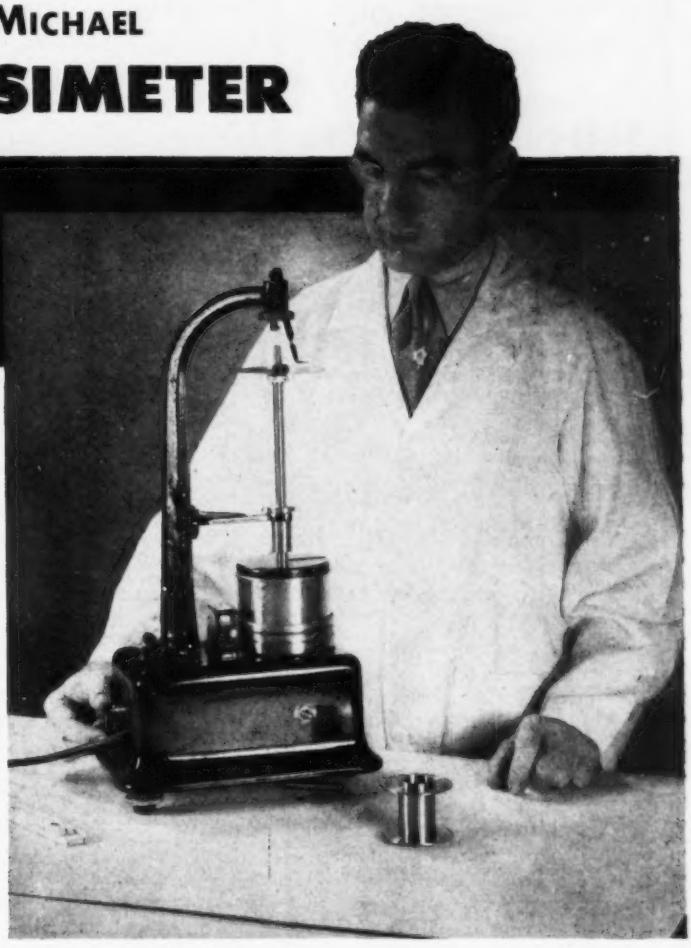

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INDUSTRY'S BOOKSHELF

Chlorine Compounds

THE PREPARATION, PROPERTIES, CHEMICAL BEHAVIOR AND IDENTIFICATION OF ORGANIC CHLORINE COMPOUNDS (Tables of Data on Selected Compounds of Order III) *by Ernest H. Huntress.* John Wiley & Sons, Inc., New York, 1948; 1443 pp., $27.50. Reviewed by Donald R. Jackson, Wyandotte Chemicals Corp.

THIS is the second volume to appear in a series of "Tables of Data" compiled by Professor Huntress, the first being "Identification of Pure Organic Compounds. Tables of Data on Selected Compounds of Order I", co-authored with the late Samuel Parsons Mulliken. The present volume deals with "Compounds of Order III", i.e., compounds containing carbon and chlorine; carbon, hydrogen and chlorine; carbon, oxygen and chlorine; and carbon, hydrogen, oxygen and chlorine, although the omission of the subtitle from the jacket and the spine might lead one to assume that all organic compounds of chlorine are included. Nevertheless, even with this restriction of scope, the undertaking is one of impressive magnitude. Data are given for 1320 compounds of Order III.

With the present work, Professor Huntress has broadened the treatment, thus multiplying its utility manyfold over that of the preceding volume which was directed essentially toward the identification of the compounds listed. Listings of both empirical and structural formulae, Beilstein references, boiling point, melting point, density, refractive index, preliminary tests and suitable derivatives are to be found as before. In addition, data on other physical properties and information on binary and ternary systems, such as freezing-point composition data and azeotrope formation are included. Many workers will be glad to find that instead of selecting a "best" value for each of the fundamental physical properties, Dr. Huntress has listed most of the values reported, along with references, so that the user may draw his own conclusions.

It may be that the organic chemist will most frequently turn to this book for its extensive treatment of preparative methods and chemical reactions. Although this material comprises a large proportion of the text, Professor Huntress has been compelled, in order to keep within one volume, to include only a selection of the more important representative information of this type and disclaims that his book should be regarded as a specialized Beilstein. However, it will serve as an excellent starting point for literature searches and the worker will often find it unnecessary to go further for the information he seeks.

Of particular note is the fact that about one-fourth of the 1320 compounds listed are not to be found in the Fourth Edition of Beilstein since they have been reported too recently to be included. The regular text is based on the chemical literature published through 1945, and a brief supplementary chapter lists some of the more important papers appearing during the period 1946-1947. The documentation with literature citations is truly staggering, there being over 22,000 in all. Selections from the patent literature are included and these are accompanied by references to the appropriate abstracts in both *Chemical Abstracts* and *Chemisches Zentralblatt.* The statement on the jacket regarding "emphasis on the industrial aspects of the compounds" seems to be justified.

Worthy of mention is the ease of locating a given compound. In addition to the usual alphabetical name index and empirical formula index, there are indexes of empirical formulas according to both percentage chlorine content and molecular weight, and an index of compounds according to chemical type.

This reviewer is impressed with the wide variety and extent of the information presented. The book will be consulted by all who work with organic chlorine compounds, whatever their fields of interest.

Plastics Data

TECHNICAL DATA ON PLASTICS *compiled and published by the Plastic Materials Manufacturers Association, Inc.,* New York, 1948; 141 pp., $2.50. Reviewed by H. Mark, Polytechnic Institute of Brooklyn.

THIS well-known compilation of technical data on plastics for the current year has been brought out in book form. It is a most useful collection of numerical data of most commercial plastics which includes the trade names and the manufacturing companies. There are 23 sections, each of which deals with one material or group of materials. In each case there is first a short description of the general properties and applications of the plastic under consideration; there follows some information about color, transparency, surface characteristics, resistance to solvents and chemicals. Finally, there are given the available quantitative data in the form

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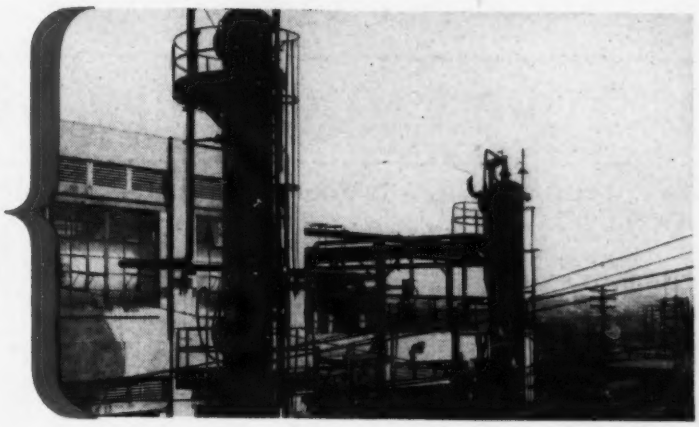

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of well arranged and compiled tables and of carefully drawn figures.

The materials contained in the book are: urea-, melamine- and phenol-formaldehyde condensation products for casting and lamination; allyl and polyester plastics; polyacrylic derivatives, polystyrene, polytetrafluoroethylene, polyvinyl- and vinylidenechloride and their copolymers, polystyrene in its various forms, polyvinyl formal and polyvinylbutyral. Sections 16-22 are devoted to the various derivatives of cellulose, such as the nitrate, acetate, propionate, aceto-butyrate and ethylcellulose. The last section deals with nylon. The book is indispensable for anybody who works technically in the plastics field and represents a most valuable source for numerical information.

Cosmetic Materials

COSMETIC MATERIALS (Vol. II of THE PRINCIPLES AND PRACTICE OF MODERN COSMETICS) *by Ralph G. Harry.* Leonard Hall, Ltd., London, 1948; 479 pp., 35s. Reviewed by John J. Craig, assistant editor, CHEMICAL INDUSTRIES.

IN PREPARING the first reference book that deals essentially with the dermatological effect of materials used in pharmaceutical and toilet preparations, the author has done cosmeticians, pharmacists, and dermatologists a signal service. It is his hope that cooperation on their part will make this book a clearing house for correlating information on the action of materials in general on the skin.

In the greater portion of the book, for each cosmetic substance the name, synonyms, formula, molecular weight, occurrence or manufacture, chemical and physical properties, uses in toilet preparations (dermatological uses are not excluded), and dermatological action are given. Some (herbals, polyhydric alcohol esters of fatty acids, etc.) are more logically treated as a group. Certain proprietary preparations that the author feels are of proved value in the industry are included among the primary materials.

The results of the authors own experiments and references culled from the chemical and medical literature document statements on the dermatological action of the substances. Where no such information is available, the author has forecast the dermatological action to be expected.

Two appendices give the methods of the U. S. Toilet Goods Association that are referred to in the text, and a discussion and listing of dyestuffs used in cosmetics.

BOOKS RECEIVED

CRYSTAL STRUCTURES, FIRST SECTION, *by Ralph W. G. Wyckoff.* Interscience Publishers, Inc. $8.00.

DRUG RESEARCH AND DEVELOPMENT, *edited by Austin Smith, M.D., and Arthur D. Herrick.* Revere Publishing Co. $10.00.

ORGANIC REACTIONS, VOL. IV., *by Roger Adams.* John Wiley & Sons, Inc. $6.00.

PHYSICO CHEMICAL EXPERIMENTS, *by Robert Livingston.* Macmillan Co. $3.50.

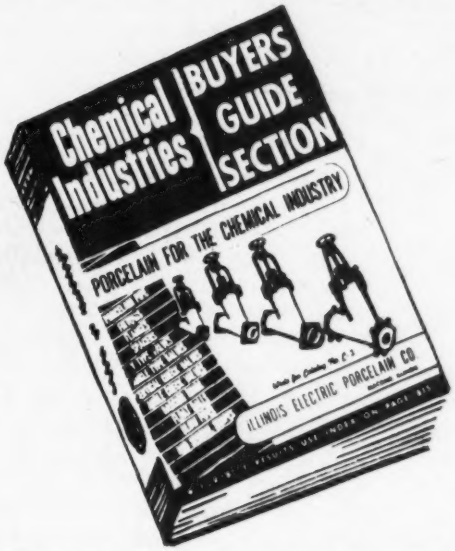
PRINCIPLES OF HIGH POLYMER THEORY AND PRACTICE, *by Alois X. Schmidt and Charles A. Marlies.* McGraw-Hill Book Co. $7.50.

REAGENTS FOR QUALITATIVE INORGANIC ANALYSIS, *by C. J. Van Nieuwenburg and J. Gilles.* Elsevier Publishing Co., Inc. $7.50.

Heat Conduction

HEAT CONDUCTION WITH ENGINEERING AND GEOLOGICAL APPLICATIONS, *by Leonard R. Ingersoll, Otto J. Zobel, and Alfred C. Ingersoll;* McGraw-Hill Book Co., New York, 1948; 278 pp., $4.00. Reviewed by Max Jakob, Illinois Institute of Technology.

THIS BOOK is devoted to the applica-



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tion of mathematics to thermal conduction problems, as based on the theoretical work of Fourier, Lord Kelvin, and others. Less ambitious, from a purely mathematical standpoint, than Carslow, the present authors have well succeeded in making the mathematics involved more easily understood and used for the solution of various problems of heat conduction in geology and engineering.

After a brief introduction, Fourier's equation and its solutions under steady- and unsteady-state conditions are treated in four chapters. Chapter 6 deals with Fourier's series and integral, and is followed by three chapters of applications, including Kelvin's method of fictitious heat sources. Ice formation is the subject of Chapter 10. Numerical and graphical methods are dealt with in the following two chapters, and methods of measuring thermal conductivities are briefly described in the last chapter. Tabulation of conductivities and of mathematical functions occurring in the theory, as well as some formulas and derivations, are given in appendices, the last of which contains 163 literature references.

The writer liked least the introductory chapter. Whereas in the preface modern nomenclature is claimed, some of the basic denotations are in contradiction to the symbols recommended by the American Standards Association, the worst being the use of T, which should be reserved for the absolute temperature scale, for degrees Fahrenheit or Centigrade, instead of t or θ as usual.

The writer liked best the clear presentation of Fourier's series and integral and of Kelvin's theory of heat sources. For mathematically less skilled readers, however, it would have been useful to mention that the transition from the series to the integral is based on the assumption $\Delta m = 1$. Otherwise, they will not understand how $\gamma \equiv m\pi/1$ and $d\gamma = \pi/1$ are compatible for $1 \longrightarrow \infty$.

Referring to Chapter 11, the reviewer cannot agree with the author's opinion that the relaxation method for one dimension is identical with the Schmidt method. The relaxation method is essentially a steady-state method, while Schmidt's method is an unsteady-state method.

The numerous examples presented vary from postglacial-time calculations to welding-process items, from estimation of the age of the earth to a fireproof-wall theory and canning-process temperatures. The modern engineering problem of the heat pump is dealt with in considerable detail and supported by mathematical tables to mention only one of the useful appendices. Sagacious argumentation is employed in dealing with some particularly difficult problems.

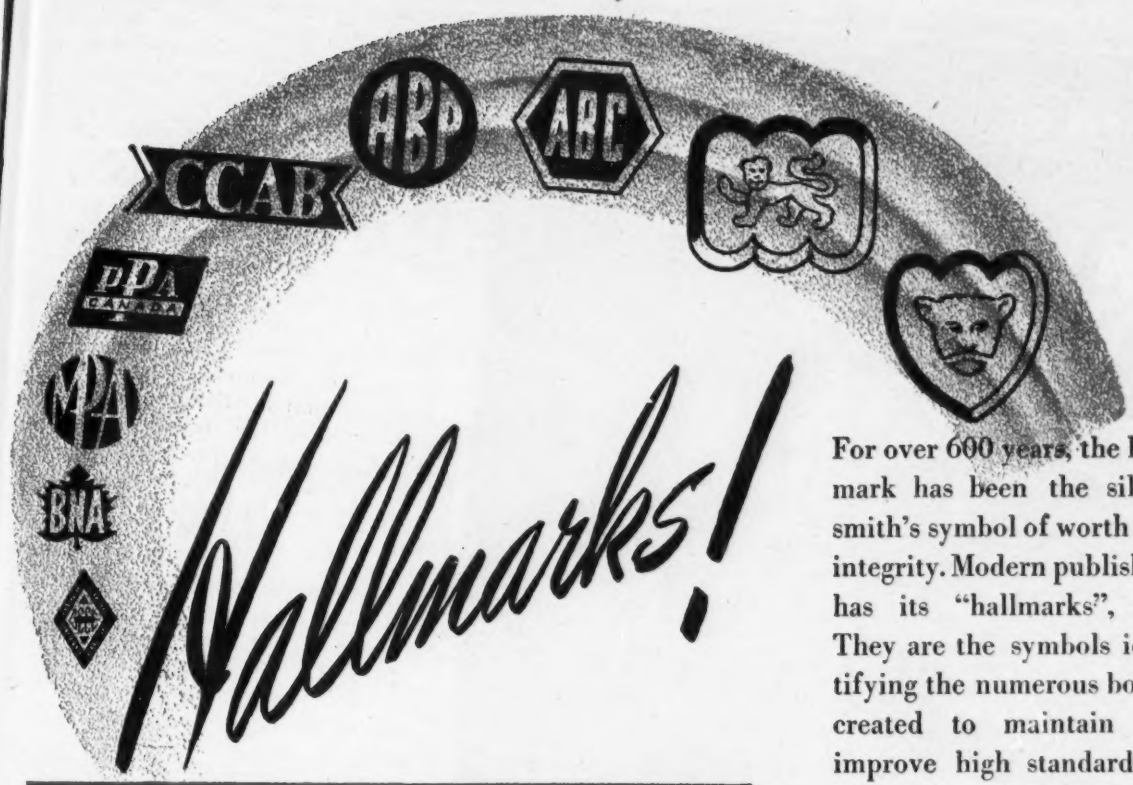
Summarizing the writer feels that this book presents a remarkable combination of the mathematical theory of heat conduction with its application to related problems and will be of great use to engineers confronted with such problems.

Phosphors

PREPARATION AND CHARACTERISTICS OF SOLID LUMINISCENT MATERIALS, *edited by Gorton R. Fonda and Fredrick Seitz.* John Wiley & Sons, Inc., New York, and Chapman & Hall, Ltd., London, 1948; 459 pp., $5. Reviewed by Edmund B. Middleton, E. I. du Pont de Nemours & Co., Inc.

IN OCTOBER of 1946, a conference on luminescence was held at Cornell University, sponsored by the division of Electron Optics of the American Physical Society. The conference provided for a general survey of various phases of the subject and also permitted contributions of original material both experimental and theoretical. This monograph contains the twenty-nine papers presented, eight of which furnish a rapid survey of this most interesting field while the remaining twenty-one papers are contributions of original researches. At the close of the conference there was an informal general discussion of current problems and this is included, forming one of the outstanding features of the book.

The first eight papers are divided into



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two groups of four papers each; one headed "General Characteristics and Methods of Preparation" and the other "Recent Developments in Theory and Experiment." They are of interest to the beginner as well as to the advanced worker in the field. Practical laboratory directions are given for making many phosphors and there is much information on the newly developed infra-red sensitive phosphors. A summary of recent work on electron trapping is included.

The twenty-one papers covering original research are divided into three groups. The first group of seven papers deals with factors affecting fluorescence characteristics. The second group containing six papers covers storage of luminescence energy while the third group, consisting of eight papers, is concerned with miscellaneous novel aspects of fluorescence. In this last group, paper No. 29 by Haynes is of particular interest as providing some insight into the mechanism of the photographic process.

In spite of the wide variety of topics, the book gives a coherent picture of the state of knowledge as of 1946 in the rapidly developing field of luminescent materials. The inclusion of an index would have been helpful.

Other Publications

AMERICAN BUSINESS AND EUROPEAN RECOVERY and THE EUROPEAN RECOVERY PROGRAM: INFORMATION FOR AMERICANS GOING ABROAD are the titles of two free booklets available from the Economic Cooperation Administration, 800 Connecticut Ave., Washington, D. C.

WHITE-COLLAR WORKERS, A PLAN FOR AUTOMATIC COST-OF-LIVING ADJUSTMENTS. $1. Kerr & Co., 704 S. Spring St., Los Angeles 14, Calif.

A MANUAL OF PORCELAIN ENAMELING, containing 127 pages of charts, graphs, and other useful data, is of interest to personnel in plants which apply enamel to steel. Enamelist Publishing Co., 4150 E. 56th St., Cleveland 5, O. Price, $1. "Abridged Edition" should be specified when ordering.

THE GLASS INDUSTRY OF GERMANY DURING THE PERIOD 1939-1945. This BIOS Over-All report (No. 4) is available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y., at 15c. 12 pp.

METHANOL. The 22nd of a series of chemical safety data sheets published by the Manufacturing Chemists' Assn., 608 Woodward Bldg., Washington 5, D. C. 20c, per copy.

1948 MODERN PLASTIC ENCYCLOPEDIA. A new and enlarged (1667 pages, 12 charts) edition of a well-known reference book. Price, $8.50. To order, or to obtain further information, write John G. Kasten, Modern Plastics Encyclopedia, 122 E. 42nd St., New York 17, N. Y.

ANALYTICAL METHODS FOR ALUMINUM ALLOYS is a 103-page technical volume published by Aluminum Research Institute, 111 W. Washington St., Chicago, Ill. Price, $1 (domestic), $1.25 (foreign).

WORLD CHEMICAL DEVELOPMENTS, 1940-1946, PART 2, by Concannon and Swift of the U. S. Dept. of Commerce, constitutes, together with Part 1 (publ. in January, 1948) a global picture of economic and commercial developments in chemicals and related commodities. U. S. Government Printing Office, Washington 25, D. C., $0.40.

HANDBOOK OF RADIOACTIVITY AND TRACER METHODOLOGY, published by the Office of Technical Services, discusses nuclei and radioactivity, measurement of isotopes and biological and medical applications of isotopes. Available from the Office, Dept. of Commerce, Washington 25, D. C., about 900 pp., $20.00. [Checks should be payable to the Treasurer of the United States.]

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Polyaminocarboxylic Acid Derivatives . **B576**
"Sequestrene." 22 pp., Technical Bul. Alrose Chemical Co.

Red Spider and Aphid Control **B577**
"Tet-200 Successor to Blot For Red Spider and Aphid Control, Greenhouse and Nursery Data Leaflet." 8 pp. Planetary Chemical Co.

Red Lead Primers for Atmospheric Exposure **B578**
"Red Lead Technical Letter No. 3." 7 pp. Technical Letter No. 3. Lead Industries Association.

Flavor Catalog **B579**
"Flavors by Fritzsche." 16 pp., Fall-Winter issue. Fritzsche Brothers, Inc.

Chlorine **B580**
"Chlorine." 72 pp. Pittsburgh Plate Glass Co.

Fighting Fire with Wetter Water **B581**
"Unox Penetrant." 20 pp. Carbide and Carbon Chemicals Corp.

Revised Catalog on Adhesives **B582**
"B. F. Goodrich Adhesives Rubber and Synthetic Bonds for Every Industrial Purposes." 6pp., Catalog Sec. 9160. B. F. Goodrich Co.

Fabrics **B583**
"Know Your Fabrics." 8 pp., Bul. No. 146. American Viscose Corp.

Fatty Acids **B584**
"Fatty Acid Components." 1p. W. C. Hardesty Co., Inc.

Color Comparator **B585**
"A Color Standards Comparator." 1 p. W. C. Hardesty Co., Inc.

Corn **B586**
"The Story of Corn and its Products." 40 pp. Corn Industries Research Foundation.

Explosives **B587**
"Explosives Products." 64 pp. Olin Industries, Inc.

Wetting Agent **B588**
"Technical Bulletin S/V Wetting Agent 1959." 6 pp. Socony-Vacuum Oil Co.

Alkyltriethoxysilanes **B589**
"Linde Data Alkyltriethoxysilanes; Ethyltriethoxysilane and Amyltriethoxysilane." 3 pp. The Linde Air Products Co.

Alkyltrichlorosilanes **B590**
"Linde Data Alkyltrichlorosilanes; Ethyltrichlorosilane and Amyltrichlorosilane." 3 pp. The Linde Air Products Co.

Metal Primer **B591**
"Technical Data Sheet—Primer #10." 2 pp. Princeton Paint Laboratories.

Plasticizer **B592**
"Adipol 10A (di-iso-octyl adipate) Plasticizer." 4 pp. Ohio-Apex, Inc.

Plasticizer **B593**
"D.I.O.P. (di-iso-octyl phthalate) Plasticizer." 4 pp. Ohio-Apex, Inc.

Detergent **B594**
"Antarox A-180, A Non-Ionic Detergent." 1 p. Antara Products Division of General Aniline & Film Corp.

Detergent **B595**
"Antarox A-200, A Non-Ionic Detergent." 1 p. Antara Products Division of General Aniline & Film Corp.

Emulsifier **B596**
"Antarox B-100, A Non-Ionic Emulsifier." 2 pp., Technical Bul. Antara Products Division of General Aniline & Film Corp.

Emulsifier and Disperser **B597**
"Antarox B-290, A Non-Ionic Emulsifier and Disperser." 2 pp., Technical Bul. Antara Products Division of General Aniline & Film Corp.

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"Laboratory Equipment Bulletin New. . . . Wide-Field Stereoscopic Microscopes." 4 pp., Bul. No. 104. Will Corp.

Pressure Reducing Valve **H851**
"Cash-Acme Pressure Reducing Valve Type 'B'." 6 pp., Bul. No. 265. A. W. Cash Valve Mfg. Corp.

Fire Hazards **H852**
"Controlling Industrial Fire Hazards." 8 pp. Nat. Bd. of Fire Underwriters.

Fluids **H853**
"Fluid Progress—Circa '48." 12 pp. The M. W. Kellogg Co.

Corrosion **H854**
"Corrosion: It's Effect in Boiler Systems." 12 pp., Tech Paper No. 111. W. H. & L. D. Betz.

Valve **H855**
"Remote Controlled Gate Valve." 2 pp. Ledeen Mfg. Co.

Fans **H856**
"Modern Propeller Fan Designs." Catalog No. 148. Ilg Electric Ventilating Co.

Equipment **H857**
"Barrett Junior Catalogue." 88pp., Junior Catalog No. 487. Barrett-Cravens Co.

Couplings **H858**
"Quick Couplings." 22 pp., Catalog No. R-100. Roylyn, Inc.

Temperature **H859**
"Tempilstiks, The Amazing Crayons That Tell Temperatures." 6 pp., Catalog No. 848. Tempil Corp.

Oil and Gas Burners **H860**
"Hauck Combination Proportioning Oil and Gas Burners." 7 pp., Catalog No. 408. Hauck Mfg. Co.

Pulleys **H861**
"Cast Iron Pulleys . . . For Industry . . . Since 1866." 16 pp., Bul. No. P-848. Sprout, Waldron & Co.

Power Factor **H862**
"Power Factor and What To Do About It." 20 pp., Booklet No. 200-TEC-1077. Electric Machinery Mfg. Co.

Paint Preheater **H863**
"Reliable Explosion Proof Viscolator." 3 pp. Reliable Products Mfg. Co., Inc.

Coal Preparation **H864**
"Pennsylvania Steelbuilt Bradford Break-

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B579	B588	B597	H858	H867	H876	H885	H894	H903
B580	B589	H850	H859	H868	H877	H886	H895	H904
B581	B590	H851	H860	H869	H878	H887	H896	H905
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er, The Versatile, Efficient Coal Crusher, Sizer and Scavenger." 15 pp., Bul. No. 3007. Pennsylvania Crusher Co.

Paper Bags **H865**
"To Serve You Better With Multi-Wall Bags." 8pp. Hammond Bag and Paper Co.

Pulleys **H866**
"Dings Magnetic Pulleys and Pulley Type Separators." 8pp., Catalog C-1001A. Dings Magnetic Separator Co.

Pulleys **H867**
"Dings Non-Electric Alnico Magnetic Perma-Pulleys." 8 pp., Catalog No. C-1007A. Dings Magnetic Separator Co.

Recorders **H868**
"Temperature and Pressure Recorders." 12 pp., Catalog 700. Penn Industrial Instrument Corp.

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"High-Speed Rotational Viscometer." 13 pp., Oct. Bul. R-B-H Dispersions Div. of Interchemical Corp.

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"Profit by Stitching." 12 pp. Acme Steel Co.

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"Burrell Industro Gas Analyzers." 7 pp., Bul. No. 213. Burrell Technical Supply Co.

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"Craftsmen Prefer Alpha Tri-Core Solder." 4 pp., Catalog No. 201. Alpha Metals, Inc.

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"Instruments for Measuring Appearance and Other Optical Factors." 8 pp. Henry A. Gardner Laboratory, Inc.

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"Gagetron Solves Many Difficult Liquid Level Problems." 2 pp., Data Sheet No. 10-4-1. The Brown Instrument Co.

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"Brown Pressure and Vacuum Gauges." 32 pp., Catalog No. 7000. The Brown Instrument Co.

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"Farris Safety and Relief Valves." 72 pp., Catalog No. 48. Farris Engineering Corp.

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"ACF Plug Valves." 32 pp., Catalog No. 4. American Car and Foundry Co.

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"Porter Lubricated Plug Valves For Accurate Positive Control of Fluid Flow." 16 pp. H. K. Porter Co., Inc.

Vertical Mixer **H894**
"Sprout-Waldron's Model 'VA' Vertical Mixer." 4 pp., Bul. VA-948. Sprout, Waldron & Co.

Insulation **H895**
"Quick Facts About Mystik Self-Stik Dri-Pipe, The New, Flexible Insulation with the Self-Adhesive Edges." 6 pp. Mystik Adhesive Products.

Pumps **H896**
"Here's The Pump That Will Not Lose Its Prime . . . Jabsco." 2 pp. Jabsco Pump Co.

Pumps **H897**
"Jabsco Corrosion Resistant Pumps." 2 pp. Jabsco Pump Co.

Burning Equipment **H898**
"Chemico Sulfur Burning Equipment." 4 p., Chemico Bul. S-110. Chemical Construction Corp.

Recorders and Controllers **H899**
"Micromax Model S. Indicating Recorders and Controllers." 32 pp., Catalog ND44(1). Leeds & Northrup Co.

Load Centers **H900**
"How Power at Load Centers . . . Pays Off!" 16 pp., Bul. 11B6285A. Allis-Chalmers Mfg. Co.

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"SK Steam Jet Exhausters and Compressors." Bul. 4-E. Schutte and Koerting Co.

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"A Turn for the Better in Positive Pumping Without Pulsation, The Astonishing R & M Moyno Pump." 4 pp. Robbins & Myers, Inc.

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"Heavy Duty Midget Chlor-O-Feeder." 4 pp., Bul. HDM-3. %Proportioneers, Inc%.

V-Belts **H905**
"Multicord Multi-V Belts." 4 pp., Catalog Sect. 2170. The B. F. Goodrich Co.

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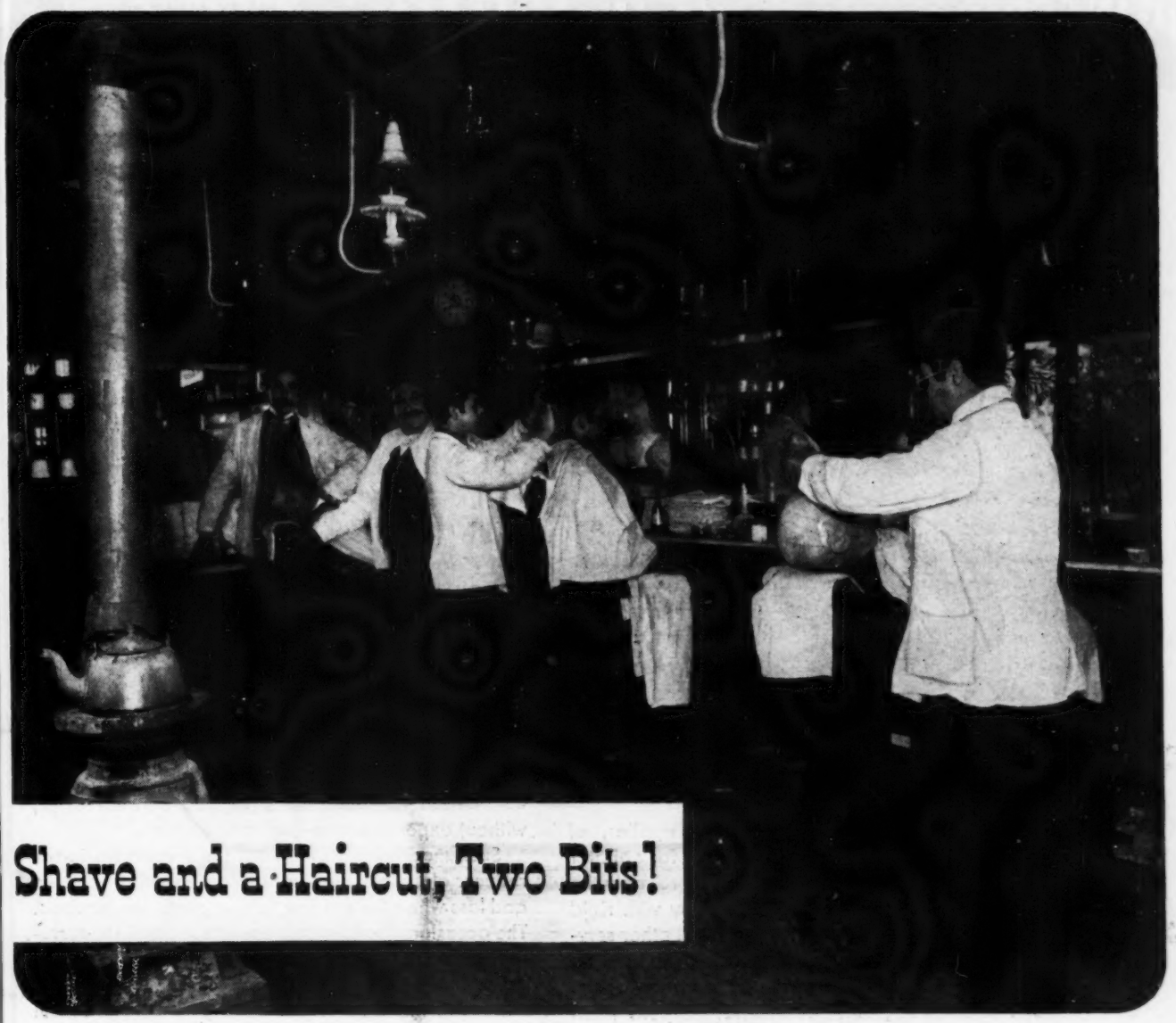

Shave and a Haircut, Two Bits!

The price of a haircut has gone up a lot since the nineties, and that's not all that has changed. Back in those "good old days" Esso Standard had just begun to study and experiment with light fraction petroleum refining...out of which came Esso Solvents.

ONE OF THESE SOLVENTS

is today used in the manufacture of razors, razor blades, and other rust-resistant metal products. Esso Solvents also play a role in many other industries . . . from automobiles to textiles, from rubber to wood preservatives . . . wherever uniform high quality and stability is required.

There are many grades of high quality Esso Solvents for many purposes. If you have any solvents problems, your nearest Esso Solvents sales representative will be glad to help you with them. Why not call or write us soon?

ESSO STANDARD OIL COMPANY
Boston, Mass.—New York, N. Y.—Elizabeth, N. J.—Baltimore, Md.
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ENGINEERING PROBLEMS IN AGITATION

PART OF A CONTINUING PROGRAM OF ENGINEERING BY MIXING EQUIPMENT CO., FOR THE ADVANCEMENT OF AGITATION

TOP-ENTERING
PORTABLES
SIDE-ENTERING

How much should a gear shaft flex between bearings?

.005? .020? .0002?

TOP ENTERING MIXERS

LABORATORY MIXERS

PORTABLE MIXERS

SIDE ENTERING MIXERS

EXPLANATION: This question applies, of course, to precision speed reducers used for agitator drives. As you know, agitator service is probably the only service where users try to get away with rigid coupling of the load to the reducer. In all other services, manufacturers insist on connecting the load by means of a flexible coupling. The illustration above shows in an exaggerated form what happens when the load is direct connected.

Gear shaft deflection of more than .0005 will shorten the life of the reducer. The larger the deflection the more serious the effect. It may also cause early failure of both lower bearings and gears.

COMPROMISE ANSWERS: Three very poor compromises can be made: (1) leave the bearing spacing the same and beef up the lower bearing to stand the gaff; (2) increase the bearing spacing by means of an extension or steeple, keeping the gear below the point of maximum flexure; (3) add another bearing below the reducer. The fact that these modifications are made on reducers of reliable manufacture emphasizes the need for a rugged agitator drive, without expensive stop-gap modification.

Such modifications increase the investment in the reducer alone and step up the consequent shut-down and loss when the reducer fails or parts are required. The occasional satisfactory use of such design, accruing from a happy combination of light duty, flexible agitator shaft, etc., cannot justify their general applications in the face of proven engineering practice: ***"Connect a speed reducer to the load with a flexible coupling."***

NEW W SERIES

SOLUTION: Mixco solves this problem with a low head room, shock proof coupling and simple reducer design. Complete details cannot be given in this limited space, but you can get them in Bulletin B-78. Send for your copy. It's good "reducer insurance" against shut-downs.

If you would like to have some phase of agitation similarly discussed, write us your suggestion. You will receive a personal reply. Write us also about your regular requirements in fluid agitation. Our wealth of background and experience gets results for you.

THE NEW LOW HEAD ROOM DRIVE

With Independent Bearings for the Agitator Shaft

SERIES W
1 to 50 H.P.
For open and closed tanks

Name .....
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Please send me the literature checked.

- ☐ B-66 and B-76 Side Entering Mixers
- ☐ B-78 Permanently Mounted Mixers for Pressure Vessels and Open Tanks
- ☐ B-75—Portable Mixers (Electric and Air Driven)
- ☐ B-77—Laboratory Mixers
- ☐ MI-11—Operating Data Sheet

Mixing Equipment Co., Inc., 1049B Garson Ave., Rochester 9, N. Y.

MIXING EQUIPMENT CO., INC. • 1049B Garson Ave., Rochester 9, N. Y.

NEWS OF THE MONTH

RFC Approves Cold Rubber Increase

Installation of refrigeration equipment in eight government-owned synthetic rubber plants to provide an 800 percent increase in output of the new "cold rubber" has been approved by Reconstruction Finance Corp.

This will raise annual production to 183,000 long tons. Decision to equip approximately half of the government's synthetic rubber plant capacity to make the new rubber, follows road and machine tests that have demonstrated that the cold rubber makes the best tire tread material known, giving about 30 percent longer mileage in tire treads than present material. The rubber is polymerized at 41 degrees or lower temperature.

One of the first plants to be converted will be that operated by U. S. Rubber Co. at Berger, Texas. This plant is now producing cold rubber at an annual rate of 3,000 tons. By the year-end, this will have been raised to 15,000, and by early 1949, to double that rate. U. S. Rubber also operates a Naugatuck, Conn., plant making the rubber.

General Tire and Rubber Co. will go to 30,000 tons per year at the Baytown, Texas, plant it operates; Firestone Tire and Rubber Co. will produce the same amount at the Lake Charles, La., plant; it is expected that B. F. Goodrich Co.'s Port Neches, Texas, plant will make 15,000 tons. Capacity of the plant operated by Copolymer Corp., Baton Rouge, La., will be raised to 30,000 tons, double the present output. Plans call for 30,000 tons from the Houston, Texas, plant operated by Goodyear Tire and Rubber Co., and 15,000 tons from the Los Angeles plant operated by the same company.

Shell Glycerine Process Wins Engineering Award

For producing glycerine synthetically for the first time in commercial quantities, Shell Development Co., research affiliate of Shell Oil Co. and Shell Chemical Corp., received the 1948 Award for Chemical Engineering Achievement, sponsored by *Chemical Engineering* magazine. The award also recognized the many accomplishments of Shell Development's research, which has included the synthesis of a long list of new chemicals from petroleum, as well as advancing oil producing and refining methods.

Formal presentation of the award was made at a dinner in the Waldorf Astoria Hotel, New York, by Alfred H. White, Professor-Emeritus, Department of Chemical and Metallurgical Engineering, University of Michigan, and chairman of a committee of 50 senior educators in the field of chemical engineering who select the recipients. Established in 1933, the award has previously served as recognition of such achievements as the development of synthetic rubber and the atom bomb.

Oxygen Plant for Coal Gasification Completed

The first tonnage oxygen plant to be used for coal gasification purposes in this country will be placed in operation shortly at the Coal-to-Oil Demonstration Plants of the Bureau of Mines at Louisiana, Mo. Originally used by the I. G. Farbenindustrie in making acetic acid and other chemicals at Hochst, Germany, this modern Linde-Fränkl unit was dismantled and shipped to the U. S. The plant, which will extract oxygen from the air, has a capacity of 23,000 cubic feet or 1 ton per hour of 98 per cent oxygen.

The coal gasification cycle in which the Linde-Fränkl unit will be used involves first crushing, pulverizing, and drying the coal. The pulverized coal then is fed to a reactor, together with oxygen and steam or carbon dioxide. Under high temperatures, the mixture reacts to form synthesis gas—the carbon monoxide and hydrogen required in the Fischer-Tropsch process and a source of hydrogen for coal hydrogenation.

Diamond to Produce Perchlorethylene

Early in 1949 Diamond Alkali Co. will start producing substantial daily tonnage of perchlorethylene at facilities now rap-

Examine Graphite at Brookhaven Laboratory Ceremony

Wells N. Thompson (left), vice-president of The H. K. Ferguson Co., the firm in charge of engineering and building the Brookhaven National Laboratory atomic pile, and Wilbur E. Kelley, manager of the New York operations office of the U. S. Atomic Energy Commission, examine a souvenir piece of graphite at a ceremony marking the setting of the first graphite block in the Brookhaven pile.

idly nearing completion at its new Houston, Texas, plant. The operation will be allied to the company's electrolytic production of chlorine and caustic soda.

National output of perchlorethylene, like carbon tetrachloride and trichlorethylene, increased several fold during the war years. Although the wartime uses have declined, the shortage of perchlorethylene has continued because of the number of peacetime applications developed for the product. In addition to the dry cleaning field, it finds use in degreasing metals, the manufacture of paint and varnish removers, and in organic synthesis.

Date Set for Pacific Chemical Exposition

The date for the second Pacific Chemical Exposition by the California Section of the American Chemical Society for 1949 has been set for November 1 through 5 at the San Francisco Civic Auditorium. The floor plan for the '49 Show is scheduled to be in the hands of former exhibitors on January 3, 1949.

As in 1947, the Pacific Industrial Conference will run concurrently with the Pacific Chemical Exposition. These one- and two-day conferences of the twelve cooperating national and local societies and associations have proved to be outstanding programs.

Lukens Appointed Merck Vice-President

Reginald P. Lukens, appointed vice-president for production of Merck & Co., Inc. He has been in charge of all Merck manufacturing since 1935, and in 1945 also assumed supervision of packaging and shipping operations.

Exporters Aim at Unity

Norman F. Revel, president of the Fine Chemical Co., recently accepted the chairmanship of the Merchant-Exporters Committee, operating as part of the International Trade Section of the New York Board of Trade. The committee was formed to find a solution to import-export problems and has experts engaged in study of such questions. The committee hopes that exporters and foreign trade groups throughout the country will join with it in attaining its goals.

Chemical Company Nine Month Earnings

Company	Net Income After Taxes 1948	1947
Air Reduction Co., Inc.	$4,697,138	$4,064,411
Celanese Corp. of America	29,792,772	16,626,579
General Aniline & Film Corp.	6,900,000	3,000,000
Hercules Powder Co., Inc.	8,328,985	10,057,668
Heyden Chemical Co.	2,634,372	1,940,261
Lion Oil Co.	8,438,043	4.856,321
Monsanto Chemical Co.	11,568,483	12,395,367
Penick & Ford, Ltd., Inc.	1,306,089	2,301,047
Phillips Petroleum Co.	55,702,772	25,706,157
Union Carbide and Carbon Corp.	73,596,110	54,865,182

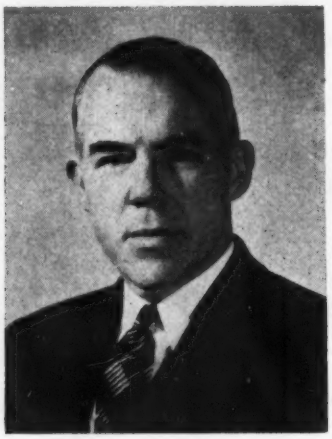
Varnish & Paint Chemistry Symposium

A symposium on varnish and paint chemistry of international significance was held recently at New York University College of Engineering. The one-day meeting featuring papers by French, English and United States representatives was arranged by the College of Engineering, the New York Paint and Varnish

Production Club, and the New York Paint, Varnish and Lacquer Association.

Among the subjects discussed were research and test methods, protective coatings, adhesion, drying oils, and electrical insulating varnishes.

Frankenhoff Forms Corporation



C. A. Frankenhoff, president of the newly formed Frankenhoff Corp., New York, which will specialize in research, development and distribution of non-metallic minerals. He has broad experience in this field.

CALENDAR *of* EVENTS

AMERICAN CHEMICAL SOCIETY, Division of Industrial and Engineering Chemistry, 15th annual chemical engineering symposium, Massachusetts Institute of Technology, Dec. 28-29.

AMERICAN CHEMICAL SOCIETY, Pittsburgh Section, 4th annual analytical symposium, William Penn Hotel, Pittsburgh, Jan. 20-21.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, regional meeting, Los Angeles, Cal., March 6-9.

AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS, annual meeting, Fairmount Hotel, San Francisco, Cal., Feb. 13-17.

AMERICAN MANAGEMENT ASSOCIATION, 18th National Packaging Exposition, Auditorium, Atlantic City, N. J., May 10-13.

AMERICAN PAPER AND PULP ASSOCIATION, annual meeting Waldorf Astoria, New York City, Feb. 21-25.

AMERICAN SOCIETY FOR TESTING MATERIALS, spring meeting, Hotel Edgewater Beach, Chicago, Feb. 28-March 4.

CHEMICAL MARKET RESEARCH ASSOCIATION, New York City, Feb. 10.

COMPRESSED GAS MANUFACTURERS ASSOCIATION, INC., annual convention, Waldorf Astoria, New York City, Jan. 17-18.

THE ELECTROCHEMICAL SOCIETY, INC., 95th convention, Benjamin Franklin Hotel, Philadelphia, May 4-7.

INTERNATIONAL ACETYLENE ASSOCIATION, annual convention, William Penn Hotel, Pittsburgh, April 25-26.

NATIONAL ASSOCIATION OF CORROSION ENGINEERS, annual conference and exhibition, Netherland Plaza, Cincinnati, April 11-14.

TANNERS' COUNCIL OF AMERICA, leather show, Waldorf Astoria, New York City, March 8-9.

TECHNICAL ASSOCIATION OF PULP and PAPER INDUSTRY, annual meeting, Commodore Hotel, New York City, Feb. 21-24.

THIRD NATIONAL MATERIALS HANDLING EXPOSITION, Convention Hall, Philadelphia, Jan. 10-14.

Carbide Ships Tank Car Ethylhexoic Acid

The first tank car of ethylhexoic acid ever shipped recently moved from the South Charleston, W. Va., plant of Carbide and Carbon Chemicals Corp. This shipment reflects the growing importance of the metallic salts of ethylhexoic acid as high quality paint dryers. New sources of raw materials have enabled Carbide to expand production.

Ethylhexoic acid, developed in 1936 as an intermediate for making triglycol dioctate, was first offered to industry as a commercial chemical just prior to World War II. Since that time, it has continued to grow in industrial importance, particularly as an intermediate in the manufacture of paint driers.

COMPANIES

PITTSBURGH PLATE GLASS CO. has acquired controlling stock interest in the MIDVALE COAL CO., an Ohio corporation. The coal company is being liquidated and its mine will be operated as the Columbia Coal Division of Pittsburgh Plate Glass Company.

The Midvale operation is situated about 45 miles from the large alkali producing plant operated by Pittsburgh's Columbia

FROM SHELL CHEMICAL...

an increased supply of

Methyl Ethyl Ketone

To help meet the needs of industry, Shell Chemical has recently placed "on-stream" at Houston, Texas, its third MEK plant. With this phase of its postwar expansion completed, one more important step has been taken toward providing industry with adequate supplies of high quality organic chemical products.

MEK has been found to be outstanding as an active solvent for nitrocellulose lacquers, as well as for fabric and surface coatings based on the various vinyl resins. It is also successfully used in the manufacture of adhesives and cements which utilize Buna-N and neoprene rubber.

Other important products in which MEK finds application are can coatings, paint and varnish removers, rubber chemicals and printing inks.

LACQUER SOLVENT PROPERTIES

Dilution Ratio	
Toluene	4.4
Aromatic Petroleum Naphtha	1.4
Aliphatic Petroleum Naphtha	0.9
Viscosity (8% RS ½ second Nitrocellulose solution at 25°C)	10 centipoises
Blush resistance (% relative humidity at 80°F)	45%
Rate of evaporation (normal butyl acetate = 1.0)	4.6

A letterhead request to any of the Shell Chemical offices listed below will bring you technical literature and a sample.

Among the many other Shell Chemical products are Methyl Isobutyl Ketone, Methyl Isobutyl Carbinol and Tertiary Butyl Alcohol

SHELL CHEMICAL CORPORATION

100 Bush Street, San Francisco 6 • 500 Fifth Avenue, New York 18
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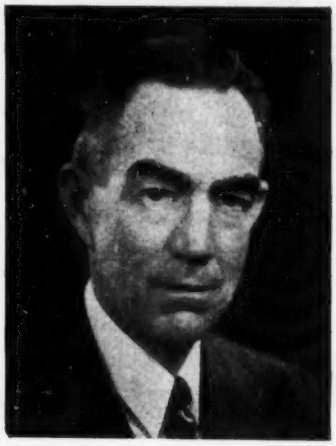
Chemical Division at Barberton, Ohio, where large quantities of fuel are used for power plant operation.

Forker Named President Of Blaw-Knox Division



Edson W. Forker, named president of the chemical plants division of Blaw-Knox Construction Co. He has managed this division since its formation in 1939.

HEYDEN CHEMICAL CORP., New York, has concluded purchase of the assets of RUMFORD CHEMICAL WORKS, near Providence, R. I.

All of the assets of Rumford were acquired by Heyden in exchange for 99,438 shares of Heyden common stock and the assumption of outstanding liabilities. The stock will be distributed pro rata among Rumford holders.

DIAMOND ALKALI CO. has opened a new Technical Service Division headed by Walter C. Bates, manager, and George F. Rugar, assistant manager.

The new organization is designed to cover what the company describes as "all phases of service work connected with the sale and use of Diamond-made alkalies, co-products, and derivative specialty chemicals."

WILLIAM D. NEUBERG CO., Inc. has been appointed exclusive world-wide sales distributor for SUSQUEHANNA CHEMICAL CORP.

William H. Boyce, who was formerly sales manager for Susquehanna, is managing the sale of these chemicals for William D. Neuberg.

WYANDOTTE CHEMICALS CORP. has acquired the manufacturing facilities and clay deposits of BLUE MOUNTAIN CLAY CO., INC., producers of Wyandotte Zorball—the all-purpose oil and water floor absorbent.

Acquisition of the Mississippi property is in line with Wyandotte Chemicals policy of controlling basic raw materials that are used in manufacturing.

The EMIL GREINER CO. has moved to 20-26 North Moore St., New York City.

IVAN BLOCH AND ASSOCIATES, an industrial consulting firm, has been organized in Oregon. The new company's address is 729 S. W. Alder St., Portland.

HAGEN CORP., combustion and chemical engineering firm, has transferred its

San Francisco offices and laboratories to new quarters in the Manufacturers' Agents Exhibit Building, 200 Davis Street, San Francisco 11, California.

A multi-million dollar plant for the manufacture of "Orlon" acrylic fiber, to be built near Camden, S. C., has been approved by the executive and finance committees of the DU PONT Co. and sumitted for ratification to the board of directors. Established for the first commercial production of this new synthetic textile fiber, the plant will be built and equipped for the most modern type of chemical operation.

Construction, expected to begin next March, will require approximately 18 months. The actual plant and utility buildings will cover an area of 20 acres. Construction work will be handled by the engineering department of the Du Pont Co., with sub-contracts for such specialties as job conditions warrant.

Gralow Appointed to Corn Products Post

R. C. Gralow, appointed sales manager of the chemical sales department of Corn Products Sales Co. He has been with the company since 1934.

The formal opening of the new HANSON-VAN WINKLE-MUNNING electrochemical laboratory at Matawan, N. J., was celebrated recently. The laboratory, with its more than 15,000 square feet of floor space, is one of the finest structures specifically designed and erected for the sole purpose of carrying on experimental and service work in the electroplating and polishing field. It contains the most advanced facilities available for research and development in the industry.

THE GLIDDEN Co. has plans for expansion and modernization of its naval stores division plant at Valdosta, Georgia, which will make it the largest pine gum-producing plant in the world.

When the program is completed, the Valdosta plant will be capable of processing more than 150,000 barrels of pine gum a year. In addition, it will be the only plant in the country equipped to store sufficient pine gum through the non-producing season to permit steady operations in gum turpentine and rosin production throughout the year.

Passenger-car tires with treads made of the new type "cold rubber" now are being manufactured on the regular pro-

duction line at the B. F. GOODRICH Co. Akron, Ohio. The new tires bear no special markings and will be released through regular sales channels.

PERSONNEL

• H. M. Hooker, chairman of the board, HOOKER ELECTROCHEMICAL CO., has been re-elected a board member of the NATIONAL INDUSTRIAL CONFERENCE BOARD for the forthcoming year.

• THE CARWIN CO., Connecticut, manufacturers of dye intermediates, has appointed Richard Kithil as vice-president in charge of sales. He was formerly associated with Carbide & Carbon Chemicals Corp., Fine Chemicals Division.

• G. M. Hebbard, vice-president in charge of operations for THE DAVISON CHEMICAL CORP., Baltimore, has been appointed a member of the Maryland State Board of Registration for Professional Engineers and Land Surveyors. His appointment extends to June 1, 1952.

• Frank K. Savage and W. M. Langdon have been elected vice-presidents of GRAHAM, CROWLEY & ASSOCIATES, INC. They will both be with the Chicago laboratory of the firm.

• William J. Mahaney, president of AMERICAN ASIATIC CORP., has been elected a member of the board of directors of GENERAL ANILINE & FILM CORP.

• Clyde W. Geiter, medical director of GEORGE A. BREON & Co., Kansas City, Mo., has been elected vice-president. The company manufactures and distributes pharmaceutical preparations to physicians.

• J. C. Weithaus, formerly manager of the Calgon Domestic Department, has been elected vice-president in charge of domestic sales, CALGON, INC.

Production

• James R. Donnalley has been appointed manager of GENERAL ELECTRIC's silicone manufacturing plant at Waterford, New York.

In November of 1943 he joined the company in the chemical section of the research laboratory, working on fundamental silicone chemistry. Later he worked on pilot work for silicones and on the design of the Waterford plant, and in 1946, took charge of the Waterford group.

• Edward J. Bock, superintendent of maintenance at the Monsanto, Tenn., plant of MONSANTO CHEMICAL CO., has been named manager of the plant there.

• G. Warren Heath has joined IRVING R. BRODY CO. as manager of the Chemical and Pharmaceutical Department. He was formerly associated with Chas. L. Huisking & Co., Inc., and Biddle Sawyer Corp., as vice-president.

• William L. Walsh has been appointed manager of the Rensselaer, N. Y., plant of GENERAL ANILINE & FILM CORP. He has been production manager at Rensselaer since 1942.

• SOUTHERN ACID AND SULPHUR CO. has appointed L. P. Thomas general manager. He will be in charge of the production, sales and purchasing departments.

• Thomas H. Derby has joined the market development department of Sylvania Division AMERICAN VISCOSE CORP. in New York. Derby came to Sylvania from MAXSON FOOD SYSTEMS, INC.

A page from the Stauffer Catalog

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RUBBERMAKERS SULPHURS

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Wolfe to Manage New 3M Plant

Robert N. Wolfe, to be manager of operations of the new plant of the Minnesota Mining & Manufacturing Co. in Bristol, Pa. He is currently manager of the company's branch plant in Hutchinson, Minn.

Sales

• Preston M. Reynolds has been appointed manager of advertising and sales promotion for the technical products division of CORNING GLASS WORKS. He replaces William J. Belknap who recently resigned from the company.

• Richard F. Tomlinson, who joined ANTARA PRODUCTS, a division of GENERAL ANILINE & FILM CORP., 2½ years ago as assistant to the advertising manager, has been appointed advertising manager of the division.

• Robert B. Anderson has been named Chicago sales representative for the chemical and pigment division of THE GLIDDEN Co. Mr. Anderson at present will maintain his headquarters at his home in Midlothian, Ill. His background includes sales and technical service work in the paint field.

• Emile Andrew Aries has joined the staff of R. S. ARIES & ASSOCIATES, Consulting Engineers, as manager of the Overseas Division. He was formerly director of chemical sales of the International Mercantile Corp.

Research

• Hyman Iserson and Maurice E. Miville have been appointed research chemists at the Whitemarsh Research Laboratories of PENNSYLVANIA SALT MANUFACTURING Co.

• Peter Van Wyck, manager of the Virginia Cellulose Division of the HERCULES POWDER Co. Experiment Station, has been appointed technical assistant to the Hercules director of research.

• John G. Dean has been appointed head of the Industrial Chemicals Section, Development and Research Division, of THE INTERNATIONAL NICKEL CO., INC. He has been associated with the activities of the Industrial Chemicals Section since 1942.

• SCOTT PAPER Co. has appointed James J. Eberl as director of chemical research of the company.

CHEMICAL SPECIALTIES

A department devoted to news of the chemical specialties field. Descriptions of new specialty products will be found in the New Products & Processes department.

Basic Flameproof Patents Now Available

The use of antimony oxide and chlorinated paraffin or chlorinated carriers, a well known combination used extensively during the war, is now available for general industrial use. These basic patents are the property of Wm. E. Hooper & Sons Co. and by arrangements recently completed are available for sub-licensing to the paint industry by the Watson-Standard Co., Pittsburgh, Pa.

This announcement comes at a time when the interest in fire protection is great and a proven method is advantageous. The Navy, through a paper presented to the American Chemical Society, has given the outstanding features that may be obtained by the medium of chlorinated organics and antimony. The unusual feature is that antimony oxide and chlorinated paraffin are particularly necessary in effecting flame retardation in low pigment volume ratio paints. Interior and exterior paints, as well as industrial finishes of various types are available and adaptable to this treatment.

Inquiries in regard to the sub-licensing arrangement should be addressed to E. H. Kipp, 1415 Park Bldg., Pittsburgh 22, Pa., or to the Watson-Standard Co., P. O. Box 1825, Pittsburgh 30, Pa.

Red Squill Reference Powder

During the past 20 months a group representing manufacturers, consumers and testing laboratories of red squill products have been working toward a standardized method of red squill bio-assay. This program is an outgrowth of the instances wherein wide discrepancies in results are reported by different laboratories bio-assaying identical red squill samples.

An important step in this standardization of testing procedures was the development of a suitable red squill reference powder, which could be used as a basis for comparing squills of unknown potency. Variations such as different strains of rats, altitude and diet would be indicated by the variations in the results obtained with the reference powder.

A "fortified" red squill powder having an LD50% of approximately 300 mg/kg has been prepared and vacuum packed in tin canisters containing 48 grams. This material is being studied in five laboratories in this country and also in England and Holland.

Although an intriguing idea, it is pointed out that, as yet, there is not sufficient research data relative to the employment of such a reference to predict its ultimate usefulness for the purpose intended. In the absence of substantial data it is hoped that through examination of bio-assay results accruing from many laboratories, the true value of a reference powder in red squill bio-assays will be revealed.

Two of the laboratories, however, have made repeated tests over a period of several months and there is no evidence of loss of toxicity and no report of caking. Additional studies are under way to establish the keeping quality of this type of reference powder and therefore the material is labelled "Tentative Red Squill Reference Powder". It is being distributed at a nominal charge by the National Pest Control Association, Inc., 3019 Fort Hamilton Parkway, Brooklyn 18, New York. Complete directions for using the tentative Reference Red Squill Powder will be sent to anyone interested.

Irvington Varnish Completes Plant

A new processing plant costing in excess of $2 million has been completed for the Irvington Varnish & Insulator Co. on Newark Bay by The H. K. Ferguson Co., industrial engineers and builders. One division of the plant will manufacture "Cap-seal" liners for bottle caps, while the other will process cashew nut shell oil into a number of commercial and industrial products.

The entire project, situated on a 10-acre site fronting Newark Bay, consists of 13 buildings and three tank farms for the storage and blending of process chemicals and cashew nut shell oil. The company has its own dock facilities on the bay which permit economical handling of the cashew liquid.

The new plant enables the Irvington company to more than double its production of "Cap-seal" liners, which are combinations of foils, cork or paper used extensively in glass packaging. The products of the cashew nut shell oil process, sold under the trade mark "Cardolite," are used in making electrical insulating varnishes, bonding resins, friction fortifiers for the brake lining industry, insecticides, plasticizers and extenders.

Manhattan Making Antipyrine

Manhattan Chemicals, Inc., has recently begun the manufacture of antipyrine (USP). Going into initial laboratory work in April, then into running the pilot plant and finally into full production, it is now one of the largest producers of this product. Actual production is 12,000 lbs. per month, divided about equally between domestic and foreign markets.

Although the primary function of the company is custom processing of chemicals, it finds the manufacture of a few proprietary products advisable. With the first of these products, antipyrine, in full production, MCI is now turning to the manufacture of certain derivatives of antipyrine and phenylhydrazine among others.

Fager Heads Special Products Division

Oscar H. Fager, who has joined Roosevelt Oil & Refining Corp. to head the newly created special products division. He has a background of 25 years in petroleum chemical by-products industry.

Board Passes on Two Putties

The Board of Standards and Appeals of New York City recently approved for use in that city a steel sash putty and an elastic glazing compound. The former is a knife grade easy working putty designed for use in steel sash and casements, interior and exterior, and consists of a uniform mixture of pigment ground to a fine texture free from all lumps. It is designed to retain its form until setting takes place and upon setting to form a firm sealer between sash and glass without peeling or cracking. The composition of this putty is 95% calcium carbonate (whiting) and a vehicle consisting of 80% pure linseed oil, 16% mineral spirits and 4% gums for binder.

The glazing compound is a mixture of 87% pigment and 13% vehicle. The pigment is 95% calcium carbonate (whiting) and the vehicle is a compound of slow oxidizing vegetable oils with non-oxidizing resin.

It is knife grade and works readily and smoothly under a knife without crumbling or cracking and after working in the hands shows good plastic qualities with-

out sliminess or stickiness and adheres satisfactorily to a surface to which it has been applied.

Volume Manufacture of Plasticizers Planned

Plasticizers for vinyl and other synthetic resins will be manufactured in substantial volume in 1949 by B. F. Goodrich Chemical Co. Production facilities now are under construction as a part of the $3 million Avon Lake, O., expansion.

While initial large-scale operations are scheduled for the second quarter of 1949, trial quantities of the new plasticizers will soon be available from the Avon Lake experimental station pilot plant.

DDT Routs Gypsy Moth in 4-Year Effort

The destructive gypsy moth caterpillar is just about extinct in Pennsylvania, according to the state department of agriculture. This announcement followed an intensive DDT spraying program in the Keystone State during April, May and June, culminating a four-year battle. The principal infestation was a 650 square-mile area of Luzerne and Lackawanna counties.

During the past spring, nearly 169,000 acres were sprayed, mostly by air. Mobile power blowers covered some 33,000 acres, while 76 acres had to be attacked by workers carrying knapsack sprayers.

At the end of four years, not a single living gypsy moth caterpillar has been found on any part of the 315,000 acres treated with DDT. Rate of application averaged one pound per acre.

New Portable CO_2 Pressure Sprayer

R. E. Chapin Manufacturing Works, Inc., Batavia, N. Y., has in full production a new pressure sprayer which features a CO_2 gas cylinder mounted on the outside of a three-gallon galvanized tank. It is designed to eliminate hand pumping when spraying agricultural chemicals, disinfectants, and cold water paints.

The separate pressure chamber permits the tank to be filled to capacity, and thus allows longer spraying before refilling. The cylinder contains 10 ounces of liquefied CO_2 gas, which is said to be sufficient for 5 complete tankfuls of spraying liquid.

Rust-Proofing Material In Wire Drawing

Metallurgists of the Jones & Laughlin Steel Corp. report that a new phosphate material which inhibits rust and helps lubricate wire in process now permits a 20 to 25 per cent increase in speed of drawing fine high-carbon wire. The new material, known as "Banox" and described by the manufacturer, Calgon, Inc., as an amorphous metaphosphate compound, has been in use at J&L's Aliquippa (Pa.) wire mill since June, 1947. This is the first application of Banox in wire-drawing, although it has been effectively employed by manufacturers of household appliances, metal furniture, and automotive bodies and parts, as a rustproofing and paint-bonding coating prior to painting.

Protection of the wire against rusting while in process not only has permitted an increase in drawing speed but also has meant a sharp reduction in damage to dies and to wire.

New Insulation Saves Space in Freezers

Use of Santocel, Monsanto Chemical Co.'s silica aerogel, has permitted important saving of space in the construction of freezer cabinets by the Whiting Corp. of Chicago, manufacturers of a national line. In one model, insulating width of freezer was halved while maintaining freezer efficiency and doubling storage space.

Santocel has been used as insulation for liquid oxygen tanks and pipe lines, airlines' thermos jugs, stratosphere testing chambers and other uses. This is the first time it has been used in freezers. The ability of the powder to "hold" temperatures has enabled the manufacturers to offer it in an apartment-sized model with the capacity of the old basement-type freezer.

CHEMICAL MARKETS

Synthetic, Natural Ethanol Resume Race

As domestic production of ethyl alcohol, which was greatly expanded for war needs comes back to the prewar rate, the race for volume production between the synthetic and fermentation materials that was interrupted during that period, resumes. Output in fiscal 1947 was 249 million proof gallons and in 1948, 332 million proof gallons as compared with 201 million in 1939 and 299 million in 1941.

The two principal sources of ethanol are fermentation of either molasses or grain, and synthesis from ethylene, a petroleum product. In 1939 and 1941, the fermentation of grain and molasses accounted for roughly 75 percent of the alcohol production with molasses as the major raw material. In 1947 and 1948 fermentation accounted for nearer 25 to 30 percent. On the other hand, production from the petroleum source has increased from 25 percent in the earlier years to approximately 45 percent today. This figure will be increased by another 5 to 6 percent as a result of new production facilities which began operation in October. In 1947 and 1948, potatoes, sulfite liquors, unfinished spirits and other redistillation products accounted for the balance of production.

During the prewar period, molasses was a much cheaper material for the manufacture of industrial alcohol than grain. About 2½ gallons of blackstrap molasses are required to produce 1 gallon of alcohol of 190 proof. A bushel of grain yields about 2½ gallons of alcohol. In the 10-year period 1931-1940, the price of 2½ gallons of molasses averaged 16½¢ while the average price of corn was 61¢ per bushel. Dividing this average price by 2½, the cost of corn per gallon of alcohol averaged 24½¢ or about one-half as much again as the corresponding figure from molasses.

Today with molasses selling at 24¢ per gallon and corn at $1.61 per bushel, the raw material costs are 60¢ for molasses and 64¢ for corn per gallon of alcohol produced. Conversion costs of the two materials are about equal. While exact cost figures for synthetic alcohol production are not known, it is evident that raw material costs are less important in over-all production cost and conversion costs per unit have been cut as production increased.

These figures indicate that in the face of sustained high agriculture prices, the fermentation process for ethyl alcohol will be at a decided disadvantage price-wise in relation to increased synthetic alcohol production. Synthetic alcohol obtained from the Fischer-Tropsch process for hydrocarbon synthesis from natural gas will make it that much tougher for the natural product.

In relation to other materials, alcohol has fallen off somewhat in demand for certain uses. These are principally solvents, where cheaper methanol and isopropyl alcohol have made inroads, and anti-freeze, where increased availability of low cost methanol and permanent types such as ethylene glycol and glycerine, have come into favor. This partial loss of the ethyl alcohol market can therefore be attributed, to substitution of cheaper materials, which for the most part, are of non-agricultural origin.

India Cuts Off Alkali Imports

The government of India has suspended the granting of licenses to import caustic soda and soda ash into India from dollar and hard currency countries. The reason given for the action is that large stocks of caustic soda and soda ash now available in India and a considerable value is represented by outstanding import licenses.

After the English withdrawal from India, a speculative market had developed in these commodities. One of the effects had been to flood this country with orders for export of these items, particularly soda ash. (CI, November, p. 769.)

Proposed Concessions On Chemicals

Concessions on a long list of dyes, tanning materials, acids and related chemicals, may be sought by countries exporting these articles, in reciprocal trade negotiations scheduled to be opened in April, 1949 with the United States, it is indicated in a list of such commodities to be considered, which has been prepared by the State Department.

The United States has announced plans for negotiations with 11 additional countries besides the 22 with which arrangements were concluded at Geneva in 1947.

Among United States imports which it is proposed to consider are the following:

From Dominican Republic; dyeing or tanning materials, all articles of vegetable origin used for dyeing, staining and coloring, except Brazil wood, madder and saffron; various sugar syrups, tank bottoms, industrial molasses.

From El Salvador: natural alizarin and natural indigo.

From Haiti: dyeing and tanning materials; essential and distilled oils; lemon grass, turmeric.

Italy: acids and acid anhydrides, boric acid, tartaric acid; corrosive sublimate; barytes ores; vermilion reds; soap; various drugs and pharmaceuticals; essential and distilled oils.

From Nicaragua: dyeing or tanning materials; fustic and Brazil wood; medicinals.

From Peru: dyeing and tanning materials; cochineal and preparations; guano; pharmaceuticals; molasses and tank bottoms.

Foreign Chemical Production Up

The chemical industries of the Latin American Republics, Africa, and Asia have been developing slowly but surely in recent years concurrent with an expanding industrialization of those regions, according to a Department of Commerce report.

The report, *World Chemical Developments 1940-46—Part II,* states that many new chemical industries have started in the Latin American Republics since 1940 covering a wide scope and including certain industrial chemicals, fertilizers, insecticides, medicinals, and plastics.

The manufacture of sulphuric acid has been extended in several of the Republics; the factory methods of producing soap have improved generally throughout the area; and plastics manufacture has been undertaken on a more or less extensive scale in Argentina, Chile, Columbia, Cuba and Uraguay.

Progress is being made toward the reconstruction of old chemical industries and the opening of new ones in China, Japan and the Republic of the Philippines.

Repair of damaged production facilities in Japan has been proceeding as rapidly as possible considering the shortage of materials and fuel. The index of chemical production which was 36.9 in 1946 had recovered to 50.5 in February 1948 compared with the 1930-34 base of 100.

Before the war the Republic of the Philippines manufactured a few chemical products but never had a highly developed chemical industry. The government is now contemplating establishment of a chemical industry as an integral part of a broad program of industrialization.

Many chemical industries have been extended and new ones started in India during the past several years and further progress in this direction is anticipated. Indian production of chemicals at the end of the war is placed at double the prewar output.

Market Review

Higher costs of production created a general upward trend in the prices of industrial chemicals. A general increase in caustic potash and carbonate potash was expected on prices for the new year when Niagara Alkali Co. raised its contract prices 3¼ to 4¼ per cent on 1949 deliveries. Although forward bookings of major chemicals proceeded well for 1949, trade was quite sluggish, particularly for caustic soda. Dealers would not meet bids below quoted prices as 4¢ to 4½¢ per pound was being asked for that commodity. Many in the alkali industry feared the consequences of the shipping strike as stocks began to grow in warehouses, and there arose the possibility of some cutback in production.

Diamond Alkali increased delivered prices of 100- and 150-pound cylinders of chlorine to keep pace with rising production and freight costs. One producer posted a ½¢ per pound increase in carbon tetrachloride, a material in very short supply for spot sale on the market. Calcium chloride was still absent from the open market as the very tight situation in that chemical continued. The position of oxalic acid remained firm at 19¢ per pound.

Industrial alcohol was one tonnage chemical that reversed the trend. The strong competitive position prevailing resulted in a drop of 5¢ to 7¢ per gallon by major producers, and this was followed by a second drop to 59½¢ per gallon for Formula 12.

Increased costs were responsible for the first advance in aspirin in over a year, as Monsanto boosted USP acetylsalicylic acid 3¢ per pound. USP powdered salicylic acid was also advanced 5¢ per pound. While the demand for winter items continued sluggish, other fine chemicals remained steady.

Recent increases in metal prices were reflected in 1¢ to 2¢ per pound advances in several lead chemicals. Lead acetate, dry white lead, white lead in oil, orange mineral litharge, and dry red lead were all raised. Pigments continued in tight supply.

As the month progressed, it became apparent that synthetic glycerin would not have any immediate effect on the market. A steady tone prevailed, and good quantities of natural glycerine moved. Natural glycerin refiners resumed their purchase of the crude with prices of 27¢ per pound being reported for soap lye. With shipments of the synthetic reportedly lagging, the market was expected to continue steady or firm.

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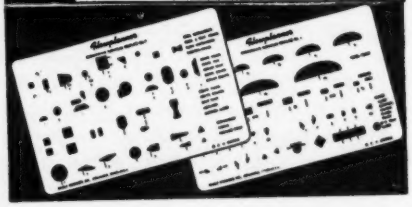

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GAS AEROSOLS

(Continued from page 972)

an aerosol insecticide should become general, it is apparent that a large volume of methyl chloride would be required.

OTHER FIELDS FOR AEROSOLS

The foregoing discussion of developments has been confined substantially to aerosols designed to kill insects of one kind or another. This by no means represents the scope of the present interest. Aerosols have been made to kill bacteria and odors. For deodorizing purposes some use strong, pleasant, masking odors while others use odor-neutralizing ingredients.

A small, domestic size bomb has been prepared containing a mixture which will impart a suntan color to the skin. This bomb permits application of a film of coloring matter to almost any depth of color and without use of any equipment other than the bomb itself.

There has been some talk of preparing mixtures containing paint or lacquer with a propellant so that a small bomb may be kept handy to refinish a worn area on a floor or wall.* With such a container it is apparent that whatever paint remains in the package is preserved—unlike the small cans of paint which in the average home become hard and useless before they are half used. Similar bombs may be made up to contain soluble dyes which may be applied to leather or fabrics to refresh the color.

A rather unusual but valuable application for some aerosol packages of the four-or-five pound size is the spraying of livestock to drive away or kill flies or other insects. Similar applications have been successful on dogs, particularly long-haired breeds, to control fleas. The active ingredient may be DDT, which has some toxicity to warm blooded animals, or the substantially nontoxic methoxy DDT.

The developments in compressed gas aerosols during the past four years have fulfilled—and in many cases exceeded—almost all of the early predictions. Yet it is felt that only the surface of their field of application has been scratched. It is a reasonable expectation that the field of usefulness of materials which may be applied by this method is likely to extend greatly.

* The first such product was placed on the retail market last month. See cut on page 972.—Ed.

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FROM WHERE WE SIT

by "DOC"

IF YOU ARE the observant type, you have already noticed a change this month in the title of this page. Here in the office we thought that "We—Editorially Speaking" gave off a stifling aroma of pomposity and pontification — whereas the fragrance we want is feather-light, somewhat *toujours gai*, and sometimes just a little ridiculous.

From where we sit the scene evokes those responses in us. Beyond our window looms the sheer cliffs of Manhattan with their myriad windows, behind which —as behind ours—transpire all the activities of the workaday world: buying and selling, telephoning and being telephoned, dictating and being dictated to. Here the titans of industry (including the chemical) leap to glory or stub their toes; here empires rise and decline; here millions of ordinary men and women work from 9 to 5 and wonder what's in the wind.

From where we sit, reading a current periodical or talking with a friend, we pick up and pass on to you some of these glimpses of the passing show—particularly as they relate to our favorite industry. That's why we think the title "From Where We Sit" describes our intentions more accurately and succinctly.

NOW THAT WE'VE recovered from our lyrical outburst, we're down to earth again to wish you all a gay Christmas and a new year marked with continuing success.

Robert L. Taylor — G. R. Gourley
Howard C. Johnson
Florence Sanders
Olga E. Vaream
Herman W. Zabel
John J. Craig
Margaret Acee — Charlie Todaro
Frank O. Mahnke Jr.
Richard F. Burkhart — Bill Glamm — Don Harway
Barbara M. Birrell

FIFTEEN YEARS AGO

(From Our Files of Dec., 1933)

Another 30-day period has come and gone and the basic NRA Code for the chemical industry remains unsigned. Code committee of the Chemical Alliance has worked feverishly to perfect a code that will meet the demands of NRA officials and yet not surrender the fundamental safeguards they feel are necessary. The Alliance has distributed to the industry the 5th revision of the code.

The Chemical Foundation has given $105,000 in aid to the pine pulp experiment station at Savannah. Dr. Herty's experimental work has progressed to the point where sizeable quantities of suitable newsprint are being made from Southern slash pine. Possible competition from Southern states has been recognized by Canadian newsprint circles.

American Cyanamid Co. has acquired General Explosives, manufacturers of blasting caps, dynamite, etc., at Latrobe, Pa.

The Du Pont Co. is arranging a vacation plan for its wage-earning employees. It will afford vacations with pay up to a maximum of one week.

Procter & Gamble has begun manufacture of a soapless lather shampoo. . . . Gardinol Corp. is now marketing flake products. . . . Albert Kingsley Church, chief chemist of Lever Bros., died November 18. . . . I. G. Farben has gone to a 5-day, 40-hour week (formerly 48 to 56), and dismissal of 12,000 employees has been halted.

THIRTY YEARS AGO

(From Our Files of Dec., 1918)

Licensing of dyestuffs importers as a means of protecting American industry from destruction through foreign competition was advocated at a gathering of dyestuffs makers and officials of the War Industries Board.

Canadian companies are now consuming 4,500-4,800 bushels of corn a day in the manufacture of acetone by fermentation. Acetone production is 7½ tons per day.

Dr. William Beckers, of National Aniline, is taking a year's leave of absence. . . . The Bureau of Internal Revenue has perfected a synthesis of glycerin from sugar. . . . Sterling Products Co. buys stock of the Bayer Co., will sell dyestuffs plant to Grasselli Chemical Co.

Abstracts of U. S. and Foreign Patents

A Complete Checklist Covering Chemical Products and Processes

Printed copies of U. S. patents are available from the Patent Office at 25 cents each. Address the Commissioner of Patents, Washington, D. C., for copies and for general information concerning patents or trade-marks.

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U. S. Patents from Official Gazette—Vol. 613, Nos. 2, 3, 4, 5; Vol. 614, Nos. 1, 2 (Aug. 10-Sept. 14)
Canadian Patents Granted and Published Sept. 7-Oct. 5

*Specialties

Canadian

Treatment of washed formaldehyde hardened artificial filamentous coagulated protein containing associated water which consists in removing the moisture from said material, thereafter heating the moisture-free material to a temperature between 85° C. and 120° C. No. 450,722. Robert Hamilton Kendall Thomson to Imperial Chemical Industries, Ltd.

Vehicle for printing inks consisting of a nonaqueous solution in a liquid polyglycol of a water-miscible salt formed by reacting substantially equimolar proportions of an amine and a resin having an acid number between 60 and 305. No. 450,733. John W. Kroeger and Daniel J. O'Connor, Jr., to Fred'k H. Levey Co., Inc.

Dielectric composition having a controllable temperature coefficient of capacity comprising predetermined quantities of the titanates of at least two of the alkaline earth metals calcium, strontium and barium and having a dielectric constant greater than 144. No. 450,945. Eugene Wainer to Titanium Alloy Mfg. Co.

*Textiles

Canadian

Wet-spinning of acrylonitrile polymer yarn by extruding a solution, in a volatile organic solvent of acrylonitrile polymer containing a major portion of acrylonitrile through a shaped orifice into a spinning bath consisting of glycerol. No. 450,544. Joseph Frederic Walker to Canadian Industries, Ltd.

In the process of coating a textile fabric with a polymer of a chloroethylene containing from 1-2 chlorine atoms on one only of the carbon atoms, the improvement of which consists in applying the vinyl resin coating to the fabric in two stages. No. 450,894. George W. Flanagan to B. F. Goodrich Co.

*Water, Sewage, Sanitation

Recovering organic acids from sour sewage sludge. No. 2,444,527. Richard D. Pomeroy.

Purification of raw waters by adding a water soluble coagulant. No. 2,444,774. Harold R. Hay to Philadelphia Quartz Co.

Production of potable water. No. 2,445,669. Alexander Goetz to Sunshine Mining Co.

Canadian

Removal of silica and other impurities from water. No. 450,605. Paul Cudell Goetz and Howard Lang Tiger to Permutit Co.

Agricultural

Herbicide comprising a combination of two basic ingredients the first being aryl substituted monocarboxylic compounds and the second being a plant bud growth inhibitor. No. 2,446,836. Gladys S. King (to James M. Fountain).

Protection of crops by soil fumigation with ethylene bromide. No. 2,448,265. John Franklin Kagy and Robert R. McPherson (to The Dow Chemical Co.).

Insecticidal composition, the essential active ingredients of which are 2,2-bis(parachlorophenyl)-1,1,1-trichloroethane and xanthone. No. 2,448,405. James F. Adams (to Allied Chemical & Dye Corp.).

Preparing parasiticides comprising the mixing of xanthone, a vegetable gum, aluminum sulphate, water, and ammonium hydroxide. No. 2,448,661. Homer L. Cupples (to the People of the U. S.)

Insecticidal composition which will remain free from crystal formation of DDT at all temperatures between about — 20° F. and 140° F. comprising a solution of about from 95 to 80 parts, by weight, of a kerosene mixture of DDT and about from 5 to 20 parts, by weight, of substantially pure alkylated naphthalenes, said kerosene mixture containing about from 3 to 10 per cent DDT. No. 2,448,665. Elmer E. Fleck and Robert K. Preston (to the People of the U. S.)

Controlling fungi and bacteria by exposing them to mixtures of aliphatic compounds having at least 12 carbon atoms and not more than about 40 carbon atoms and containing per average molecule more than one amino group, at least one olefinic double bond, combined chlorine only in the form of 0.5 to 1.5 nonionizable chlorine atoms, and an oleophilic hydrocarbon chain of at least 8 carbon atoms linked in an amino group. No. 2,448,910. Thomas E. Reamer (to Shell Development Co.).

Comminuting impure DDT. No. 2,449,028. Isaac F. Walker (to E. I. du Pont de Nemours & Co.).

Composition for the control of coccidiosis in poultry by oral administration comprising a substance from the group consisting of phenyl-arsonic acid, p-hydroxy phenylarsonic acid and water soluble salts thereof. No. 2,449,080. Orley J. Mayfield, Neal F. Morehouse and Arthur W. Walde to Dr. Salsbury's Laboratories.

Composition for the control of coccidiosis in poultry containing a water soluble salt of p-hydroxy phenyl arsonic acid. No. 2,449,081. Orley J. Mayfield, Neal F. Morehouse and Arthur W. Walde to Dr. Salsbury's Laboratories).

Insecticidal composition comprising an insecticidal nicotine compound and phthalonitrile as a synergist therefor. No. 2,449,533. Edward R. McGovran, Elmer L. Mayer and Florence B. Talley (to U.S.A. as repres. by Secretary of Agriculture).

Biochemical

Method of preparing penicillin. No. 2,446,574. Chester J. Cavallito and Frederick K. Kirchner (to Winthrop-Stearns Inc.).

Production of yeast in a sugar containing nutrient medium. No. 2,446,737. Firmin Boinot and Jean Boige (to Les Usines de Melle).

Producing a nutrient for microorganisms from corn steep water to increase concentrating the corn steep water to increase its total solids content, adding yeast to said steep water to ferment carbohydrates present in said steep water, adding an alkali to said steep water to render it strongly alkaline, heating to precipitate coagulable solids, separating the precipitated solids and substantially neutralizing said liquid components. No. 2,448,680. Robert P. Myers and Marvin L. Speck (to National Dairy Research Laboratories, Inc.).

Production of penicillin by subjecting an aqueous medium containing inorganic nutrient salts and a carbohydrate of the class consisting of molasses and brown sugar to the action of a penicillin-producing strain of a mold belonging to the genus Penicillium, under aerobic submerged conditions. No. 2,448,790. Jackson W. Foster and Lloyd E. McDaniel (to Merck & Co., Inc.).

Production of penicillin by propagating a penicillin-producing strain of *Penicillium notatum* in an aqueous medium containing cottonseed meal under aerobic submerged conditions. No. 2,448,791. Jackson W. Foster and Lloyd E. McDaniel (to Merck & Co., Inc.).

Producing penicillin in submerged culture which comprises growing a Penicillium mold of the notatum-chrysogenum group in a culture medium in the presence of an effective amount less than about 1% of N-(2,2-diethoxyethyl)-phenylacetamide. No. 2,449,193. Otto K. Behrens, Reuben G. Jones and Quentin F. Soper (to Eli Lilly & Co.).

Method of producing penicillin in submerged culture by growing a Penicillium mold of the notatum-chrysogenum group in a culture medium in the presence of N-(1,3-dihydroxy-2-propyl)-phenylacetamide. No. 2,449,195. Otto K. Behrens and Joseph W. Corse (to Eli Lilly & Co.).

Cellulose

Solutions of cellulose triacetate in a normally liquid alkyl polyhalide and a normally liquid alcohol. No. 2,447,459. Keith Famulener and Russell P. Easton (to General Aniline & Film Corp.).

Method of dissolving cellulose in ammoniacal copper compounds. No. 2,447,514. Theodor Lieser (to American Bemberg Corp.).

Process of transforming a cellulose ether which will not readily dissolve substantially completely in 8-9% aqueous NaOH solution into a product which will dissolve sufficiently in 8-9% aqueous NaOH solution to give a solution sufficiently concentrated to be suitable for being shaped and coagulated, which process comprises dissolving such ether by maintaining a mixture containing such ether in aqueous caustic alkali solution. No. 2,447,756. Leon Lilienfeld, deceased, by Antonie Lilienfeld (to Lilienfeld Patents Inc.).

Transforming a cellulose ether which will not readily dissolve substantially completely in aqueous caustic alkali solution into a product which will dissolve, which process comprises dissolving such ether by maintaining a mixture containing such ether in aqueous caustic alkali solution until said ether has substantially completely dissolved. No. 2,447,757. Leon Lilienfeld, deceased, by Antonie Lilienfeld (to Lilienfeld Patents, Inc.).

Manufacture of alkali cellulose of low water and alkali content suitable for the production of cellulose ethers by contacting cellulose with a concentrated aqueous solution of caustic alkali. No. 2,447,914. Andreas Ruperti (to Ciba Ltd.).

In a process for the recovery of water-soluble organic acid esters of cellulose from the aqueous aliphatic acid solution in which said esters are ripened to water-solubility and in which there is present an inorganic acid ripening catalyst, the steps which comprise neutralizing the inorganic acid ripening catalyst present in the aqueous aliphatic acid solution, and subjecting the resulting aliphatic acid solution if the organic acid ester of cellulose to extraction with a substantially water-insoluble organic extractant selected from the group consisting of ethyl acetate, butyl acetate, petroleum ether and mixtures thereof, isopropyl ether and mixtures of ethyl acetate and benzene. No. 2,448,082. Robert M. Creamer (to Celanese Corp. of America).

Plastic composition consisting of a cellulose derivative taken from the group consisting of cellulose ethers and esters; and an ester of a polylactic acid of the formula:

$$CH_3CH(OH)COO—CH(CH_3)—COO—CH_2—CH_2—OR$$

where R is a lower alkyl substituted phenyl radical; the said polylactic acid ester being present in an amount to plasticize the cellulose

* *U. S. Patents from Vol. 611, Nos. 4, 5. Vol. 612, Nos. 1, 2, 3, 4. Vol. 613, No. 1. Canadian from June 22-August 3.*

derivative. No. 2,448,873. Martin L. Fein and Charles H. Fisher (to the U.S.A. by the Secretary of Agriculture).

Preparing oxidized cellulose in woven form which comprises immersing air-dry woven cellulose in a solution of nitrogen dioxide in carbon tetrachloride for 1-16 hours whereby a substantial carboxyl content is imparted to the cellulose. No. 2,448,892. William O. Kenyon and Edward C. Yackel (to Eastman Kodak Co.).

Thermoplastic composition comprising a cellulose derivative, selected from the group consisting of lower aliphatic acid esters of cellulose and cellulose ethers, and at least one plasticizer selected from the group consisting of triphenyl phosphate and phenyl salicylate, stabilized by having incorproated therein a salt selected from the group consisting of alkali metal and alkali-earth, metal salts of hydroxy aliphatic mono carboxylic acids. No. 2,449,149. Ovid Santoro and Edwin Jaskot (to Celanese Corp. of America).

Ceramics

Glass having low power factor which consists essentially of SiO_2 BaO, PbO, K_2O, Na_2O, and Li_2O. No. 2,449,099. William H. Armistead (to Corning Glass Works).

Canadian

Increasing the impact strength of a glass article pre-stressed by heat treatment, which comprises treating the article with hydrofluoric acid to remove the surface layer likely to have been overstressed by the heat treatment and to contain minute flaws whereby the stress within the glass is redistributed and flaws extending beyond said surface layer are rounded out. No. 451,656. Howard J. Tait and Robert E. Keller (to Holophane Co., Inc.).

Coatings

Drying oil composition. No. 2,446,652. Edward Hazlehurst (to Congoleum-Nairn Inc.).

Solid, fusible impregnating and coating composition, resistant to the solvent action of hydrocarbons, which comprises a mixture of a solid, substantially saturated ester of a fatty acid containing more than ten carbon atoms per molecule and a polyhydric alcohol. No. 2,447.506. Louis John Jubanowsky (to The Baker Castor Oil Co.).

Steel cartridge case having thereon a corrosion resisting coating comprising an undercoat of a phosphate, a coat of furfuryl alcohol resinified with phosphoric acid superimposed on said phosphate coat, and a thin exterior coat of wax. No. 2,448,397. Albert A. Schilling and Walter L. Finlay (to Remington Arms Co., Inc.).

Producing a Gardner non-break oil by solvent extraction of a vegetable oil containing break constituents with a small proportion of a halogenated low aliphatic acid in the presence of water. No. 2,448,434. Jakob L. Jakobsen (to General Mills, Inc.).

Paint composition comprising an alkyl resin as a principal vehicle and normally deficient in hiding power containing a halogenated amine in an amount sufficient to increase the hiding power of the paint. No. 2,448,505. Paul Zurcher (to Continental Oil Co.).

Preparing a film-forming air-drying polymeric thio ether by heating a dithiol and divinylacetylene in the presence of a catalyst and in the presence of a cosolvent for the catalyst and reactants. No. 2,448,987. Carl M. Langkammerer (to E. I. du Pont de Nemours & Co.).

Protective coating for applying to the fingers prior to applying nail polish to bound the nail and to define a nail polish receiving area; the composition consisting essentially of a waxy material, a cellulose derivative and a volatile solvent therefor, and a compatible softener plasticizing the waxy material; the waxy material and compatible softener together constituting the major quantity of non-volatile ingredients. No. 2,449,070. Ethel Hauser.

Paint composition comprising a metal amino sulfate from the group consisting of copper, cadmium, and zinc amino sulfates, titanium oxide in powder form, finely divided mica potassium silicate and water. No. 2,449,346. Wesley G. Vannoy (to E. I. du Pont de Nemours & Co.).

Canadian

Method of coating solid surfaces with fused boron oxide which comprises passing a gas containing a boron compound of the group consisting of boron oxide and a boron compound thermally decomposable to boron oxide distributed therein into contact with the solid surfaces while said surfaces are maintained at a temperature above the melting point of boron oxide. No. 451,316. Frank Porter (to The Solvay Process Co.).

In a process for producing coatings upon iron group metals the step comprising electrolysing an iron group metal anodically in a solution having a pH of about from 4.2 to 5.9 containing lead sulphamate. No. 451,450. Ernest William Schweikher (to Canadian Industries, Ltd.).

Detergents and Surface-Active Media

Improving the color of surface-active agents by reacting a hydrocarbon mixture with a nitrosating agent and an aqueous solution of a water-soluble sulfite. No. 2,447,308. Leland James Beckham and William Alfred Fessler (to Allied Chemical & Dye Corp.).

Preparing a preferentially oil-soluble alkylated aromatic sulfonate comprising sulfonating an alkylated aromatic hydrocarbon having at least 18 carbon atoms in the alkyl group with sulfur trioxide, blowing with a gas to remove SO_2 and SO_3, contacting with a small amount of an adsorption clay and neutralizing said clay-contacted alkylated aromatic sulfonic acid. No. 2,448,184. Norman E. Lemmon (to Standard Oil Co.).

De-emulsifying a water-in-tar emulsion resulting from a gas-making operation which comprises adjusting the pH of the water phase and heating the resulting mixture in the presence of a water soluble sulphonate of an aromatic hydrocarbon. No. 2,448,684. Sebastian A. Petrino.

Canadian

Composition of matter selected from the group consisting of sulfated hydrogenated castor oil and phosphogenated hydrogenated castor oil having an iodine value less than 11. No. 450,989. George William Fiero.

In the process of preparing detergent compositions in iron-containing equipment comprising sulphonating organic compounds and neutralizing the product of said sulphonation, the improvement which comprises carrying out said neutralization in the presence of phosphatic material from the group consisting of phospheric acids and water-soluble salts thereof in an amount sufficient to inhibit corrosion of said equipment but insufficient to cause substantial phosphation of the organic compounds. No. 451,472. Russell Park McGhie (to Colgate-Palmolive-Peet Co.).

Dyes, Pigments

Chromium complexes of pyrazolone azo dyes. No. 2,446,662. Abby Ware Nies (to American Cyanamid Co.).

o:o'-dihydroxy azo dyestuffs. No. 2,447,163. Achille Conzetti (to J. R. Geigy A.G.).

Chromable monoazo dyes. No. 2,447,164. Achille Conzetti (to J. R. Geigy A.G.).

Metallizable polyazo dyestuffs. No. 2,447,222. Walter Wehrli and Charles Petitjean (to Sandoz Ltd.).

Trimethine cyanine dyes. No. 2,447,332. Frances M. Hamer and Edward B. Knott (to Eastman Kodak Co.).

Modifying a pigment comprising calcium carbonate by subjecting a slurry comprising said pigment and water to blows from the teeth of a circular saw rotating at a peripheral velocity of not less than 100 feet per second. No. 2,447,532. Harold R. Rafton (to Raffold Process Corp.).

Azo dyestuffs of the pyrazolone series. No. 2,447,867. Abbey Ware Nies (to American Cyanamid Co.).

Anthraquinone vat dyestuffs. No. 2,447,981. Francis Irving and Alistair Livingstone (to Imperial Chemical Industries Ltd.).

Dyeing textile fibers with vat dyes. No. 2,447,993. Nicholas R. Vieira (to E. I. du Pont de Nemours & Co.).

Machine for impacting pigments against a rotating disk element. No. 2,448,049. Harold R. Rafton (to Rafton Engineering Corp.).

Dyestuffs of the anthraquinone series. No. 2,448,094. Ernst Gutzwiller (to Sandoz Ltd.).

Green tetrakisazo dyes. No. 2,448,158. Chiles E. Sparks, James W. Libby, Jr. and Joseph H. Trepagnier (to E. I. du Pont de Nemours & Co.).

Dyeing nitrogenous textile fibres by treating with an aqueous solution containing a small quantity of free acid and a compound selected from the group consisting of cyanamide, dicyandiamide, melamine, dicyandiamidine guanidine, biguanide, alkyl, hydroxyalkyl, and aryl substituted dicyandiamidines, guanidines and biguanides, and salts of dicyandiamidines, guanidine, biguanide and the alkyl, hydroxyalkyl and aryl substituted dicyandiamidines, guanidines and biguanides, and dyeing the thus-treated fibres with a direct cotton dyestuff from a neutral bath. No. 2,448,448. James Hutchinson MacGregor (to Courtaulds Ltd.).

Dyeing textile material with dyed alkyl cellulose ether. No. 2,448,515. William B. Carroll, Jr. (to Dan River Mills, Inc.).

Obtaining small particle size, soft-textured, friable, anhydrous TiO_2 having an average particle size corresponding to the colloidal TiO_2 from which it is prepared, which comprises neutralizing a peptized colloidal TiO_2 dispersion free from extender particles, by means of an alkaline reagent, and then calcining the coagulated TiO_2 product in the presence of the salt formed by reaction between the alkaline agent and the peptizing agent in said colloidal dispersion. No. 2,448,683. James Howard Peterson (to E. I. du Pont de Nemours & Co.).

Tribiphenylmethane dyestuff and pigment dyestuffs and process for making the same. No. 2,448,823. Alexander H. Popkin (to Sun Chemical Corp.).

Sulfonamido disazo dye. No. 2,448,853. Charles F. H. Allen, Charles V. Wilson and Gordon F. Frame (to Eastman Kodak Co.).

Acid chromable monoazo dyestuffs and a process of making same which comprises coupling 2-amino-8-hydroxynaphthalene-6-sulfonic acid with a diazotised amine. No. 2,449,130. Adolf Krebser and Werner Kuster (to J. R. Geigy).

Canadian

Coloration of organic acid ester of cellulose textile materials by impregnating an organic ester of cellulose textile material with an aqueous dispersion of a vat dyestuff, drying, reducing the vat dyestuff to the leuco form on the organic acid ester of cellulose material with a dilute aqueous solution of sodium hydrosulphite containing sodium carbonate, and oxidizing the leuco vat dye on said material back to the coloured form with a dilute solution of sodium bichromate. No. 451,270. Cyril M. Croft and Walter H. Kindle (to Camille Dreyfus).

Equipment

Liquefaction and rectification column. No. 2,446,534. Arthur J. Fausek and Irwing F. Fausek.

Liquefaction and rectification column. No. 2,446,535. Arthur J. Fausek and Irwing F. Fausek.

Pressure responsive controller device. No. 2,446,546. Alexander W. Meston (to Sperry Corp.).

Float valve. No. 2,446,549. Augustus Norman.

Axial-flow compressor or blower. No. 2,446,552. Arnold H. Redding (to Westinghouse Electric Corp.).

Centrifugal apparatus. No. 2,446,559. Laurence P. Sharples (to Sharples Corp.).

Check valve. No. 2,446,571. Lindsay H. Browne (to American Brake Shoe Co.).

Sludge trap. No. 2,446,587. Robert S. Henry.

Air pressure gauge. No. 2,446,632. Lysle D. Cahill and Victor T. Uber (to Jack & Heintz Precision Industries, Inc.).

Valve. No. 2,446,714. Charles Eric Milner.

Calibrating fluid pressure gauges. No. 2,446,740. Frank Donald Burns (to Hays Corp.)).

Continuous rotary filter. No. 2,446,746. Harry W. Denhard, Frank W. Brittain and Anthony G. Serpas (to Oliver United Filters, Inc.).

Constant flow pump. No. 2,446,748. Henry L. Etter.

Tank valve. No. 2,446,767. Lorenzo D. James.

Heater for granular solid material. No. 2,446,805. Eric V. Bergstrom (to Socony-Vacuum Oil Co., Inc.).

Liquid gauge for tanks. No. 2,446,844. Harry Molaver (to Oil Equipment Mfg. Co.).

Distillation and heat exchange apparatus. No. 2,446,880. Robert V. Kleinschmidt (to Arthur D. Little, Inc.).

Candle filter for filtering flowing cellulose solutions. No. 2,446,979. Kenneth M. McLellan (to Industrial Rayon Corp.).

High-pressure coupling for tubing. No. 2,447,060. George E. Franck (to The Imperial Brass Mfg. Co.)).

Valve assembly for pressure regulators. No. 2,447,067. James K. Hamilton (to Air Reduction Co., Inc).

Separating liquid or foreign matter in suspension from fluid under pressure. No. 2,447,119. Harold J. Goodyer.

Fluid control valve. No. 2,447,207. William A. Ray (to General Controls Co.).

Pipe coupling and fastening device. No. 2,447,221. Alfred Warring.

Surface condenser. No. 2,447,259. Charles E. Lucke (to Worthington Pump and Machinery Corp.).

Sludge settling and dewatering tank. No. 2,447,286. Carlos B. Smith and Harry Leslie Bullock.

Fluid heater. No. 2,447,306. Ervin G. Bailey and Ralph M. Hardgrove (to The Babcock & Wilcox Co.).

Control apparatus. No. 2,447,331. Le Roy A. Griffith (to Minneapolis-Honeywell Regulator Co.).

Temperature responsive measuring system. No. 2,447,338. Anthony J. Hornfeck (to Bailey Meter Co.).

Power-operated check valve. No. 2,447,408. Donald G. Griswold (to Clayton Mfg. Co.).

Pump. No. 2,447,467. George H. Palm (to Stewart-Warner Corp.).

Guided free film distillation method. No. 2,447,746. Seymour W. Ferris and Edward R. Lamson and Douglas M. Smith (to The Atlantic Refining Co.).

Flow-proportioning valve. No. 2,447,920. Charles M. Terry (to A. W. Cash Co.).

Rotary blower, compressor, and exhauster. No. 2,447,961. John Rodway.

Mixing apparatus having a substantially cylindrical elongated chamber having a peripheral wall presenting smooth inner surface with an inlet and an outlet for the continuous flow of a fluid therethrough, a jacket encircling said chamber and having an inlet and an outlet for a heat exchange medium, and an agitator within said chamber. No. 2,448,042. Bruce De Haven Miller (to The Girdler Corp.).

Cyclic regulation of crystallizers. No. 2,448,538. John E. Mason (to The Stearns-Roger Mfg. Co.).

Leak detector. No. 2,449,053. Henry L. Burns and James H. Thomas.

Constant flow gas analyzer. No. 2,449,067. Victor Guillemin, Jr.

Gas analysing apparatus for continuously determining the percentage of free oxygen in a pressure sample flow of gas comprising, in combination, a catalytic analyzing cell including a heated catalytic wire, a mixing chamber having a conduit leading to said cell, conduit means communicating with said chamber for delivering a vaporizable liquid fuel thereto, means in said chamber to vaporize said fuel, conduit means communicating with said chamber for delivering sample gas thereto, conduit means communicating with said chamber for delivering air thereto to provide an oxygen bias, and common means to regulate the temperature of the materials flowing to and the mixture flowing from said chamber. No. 2,449,485. Clarence Johnson (to Bailey Meter Co.).

Canadian

Valve. No. 450,978. Arthur John Fausek and Irwing Frank Fausek.

Valve. No. 450,979. Arthur John Fausek and Irwing Frank Fausek.

Valve. No. 450,980. Arthur John Fausek and Irwing Frank Fausek.

Liquid Level Gauge. No. 451,083. Abraham Edelman (to The Liquidometer Corp.).

Liquid Level Measuring Device. No. 451,085. Clarence Adair deGiers and Abraham Edelman (to The Liquidometer Corp.).

Heat-exchanger comprising a series of heat-transfer plates, each plate having in one face a number of grooves extending in the same general direction to form a set of fluid passages and having in its other face a number of similar grooves directed at an angle to those in the first face and forming a second set of fluid passages. No. 451,086. Alberto Jorge Morris (to R. A. Lister & Co.).

Liquid Level Indicator. No. 451,128. Charles F. Wallace (to Wallace & Tierman Products, Inc.).

Dry powder fire-extinguisher. No. 451,401. Michael E. Keefe, Jr. and Ida K. Keefe.

Flow control apparatus. No. 451,486. Nathaniel Brewer (Fischer & Porter Co.).

Apparatus for manufacturing finned tubes. No. 451,613. John W. Brown, Jr. (to Brown Fintube Co.).

Liquid level control apparatus. No. 451,669. Ralph W. DeLancey (to The Miller Co.).

Food

Utilizing proteinaceous waste liquids comprising recovering the insoluble proteins and carbohydrates by mechanical separation, then subjecting to ion exchange. No. 2,,446,913. Victor L. Erlich.

Enriching stillage by inoculating with bacteria of the genus Aerobacter capable of synthesizing components of vitamin B-complex. No. 2,447,-814. Arthur F. Novak (to Joseph E. Seagram & Sons, Inc.).

Method of concentrating fruit juice comprising cooling the juice to the point of ice formation by the evaporation of some of its water under vacuum, continuing the application of vacuum until a sufficient fraction of the partially concentrated juice has been frozen to substantially pure water ice crystals to bring the mass to a state of wet slush, and separating the remaining liquid content from the ice crystals. No. 2,448,-802. Richard Holzcker (to Florida Frozen Fruits, Inc.).

Flavoring compound comprising a quantity of vanillin, a quantity of caramel substantially equal to that of said vanillin, a quantity of coumarin equal to substantially one-fourth the quantity of said vanillin, a quantity of alcohol equal to substantially four times the quantity of said vanillin, and water in a quantity sufficient to raise the volume to one gallon, said vanilin in said compound comprising one-half ounce. No. 2,448,896. Charles Levy.

Canadian

Improving the resistance to foaming of cooking fats by adding a small amount of a non-toxic water insoluble polyvalent salt of a high molecular weight aliphatic monocarboxylic acid to the cooking fat. No. 451,071. Howard C. Black (to Industrial Patents Corp.).

Deep fat frying without substantial foaming by adding a small amount of a non-toxic, water soluble, oil soluble salt of an organic polyoxygen containing acid to a non-aqueous glyceride of a fatty acid. No. 451,073. Howard C. Black (to Industrial Patents Corp.).

Mineral supplement to supply calcium and phosphorus to the diet, said supplement comprising a mixture of 15 parts to 40 parts of monocalcium orthophosphate and 85 parts to 60 parts of dicalcium phosphate dihydrate, and a small amount of a molecularly dehydrated alkali metal phosphate as an anti-caking agent. No. 451,092. Theodore W. Schilb (to Monsanto Chemical Co.).

Production of vitamin A by condensing a compound of the group consisting of methyl vinyl ketone and an aldehyde having the empirical formula $C_{14}H_2O$. No. 451,114. Nicholas A. Milas (to Research Corp.).

Inorganic

Method of decomposing alkali metal salts yielding metal oxides by heating and leaching. No. 2,446,595. Felix Jourdan and Jorge Beeche.

Preparing uranium hydride from water vapor and uranium metal. No. 2,446,780. Amos S. Newton (to U. S. A., represented by U. S. Atomic Energy Commission).

Apparatus for forming gel into beads. No. 2,446,783. John W. Payne (to Socony-Vacuum Oil Co., Inc.).

Apparatus for manufacture of spheroidal particles. No. 2,446,784. Henry G. Daley, John W. Payne and Edmund L. Sargent (to Socony-Vacuum Oil Co., Inc.).

Purifying aqueous alkali metal hydroxides by treating with an immiscible solvent. No. 2,446,868. George Lewis Cunningham (to Diamond Alkali Co.).

Preparing calcium hypochlorite substantially free from calcium chloride, by carbonating and vigorously agitating an aqueous slurry of basic calcium hypochlorite. No. 2,446,869. George L. Cunningham (to Diamond Alakli Co.).

Defluorination of phosphate rock by calcination in the presence of water vapor. No. 2,446,978. Ernest J. Maust (to Coronet Phosphate Co.).

Catalyst composition of zinc aluminate spinel supporting a metal oxide. No. 2,447,017. Kenneth K. Kearby (to Standard Oil Development).

Preparing catalysts for benzine synthesis. No. 2,447,029. Otto Roelen and Walter Feisst (vested in the Attorney General of the United States).

Oxygen absorbent media consisting of a melt of potassium chloride, cuprous chloride and cupric chloride. No. 2,447,323. Celeste M. Fontana (to Socony-Vacuum Oil Co., Inc.).

Sodium fluosilicate from fluorine compounds contained in superphosphate gases by spraying water. No. 2,447,359. Llewellyn Cardiff Oakley, Jr. (to Tennessee Corp.).

Aluminum hydroxide from silicates by reacting with a mixture of sulphuric acid and hydrofluoric acid. No. 2,447,386. George Antonoff.

Treating artificial magnesium hydrate to produce magnesia. No. 2,447,-412. Russell Pearce Heuer (to General Refractories Co.).

Electrolytic alkali chlorine cell. No. 2,447,547. Kenneth E. Stuart (to Hooker Electrochemical Co.).

Method of making lead chloride which comprises circulating over metallic lead a heated solution of lead chloride acidified with hydrochloric acid, introducing chlorine gas into the circulating solution and forming lead chloride by the reaction of chlorine with metallic lead, withdrawing at least part of said acidified chlorine-containing solution from contact with said metallic lead as it becomes substantially saturated with lead chloride, cooling the withdrawn solution and thereby precipitating a substantial amount of lead chloride, separating the precipitated lead chloride from the residual solution, and heating the residual solution and again circulating it. No. 2,447,742. Harry S. Davidson and Louis J. Gagliano (to Imperial Paper and Color Corp.).

Method of recovering chlorine from a mixture of gases in which chlorine is the major constituent most readily soluble in water, which comprises washing the gas mixture with an aqueous medium from the class consisting of water and dilute solutions of chlorine in water under such conditions as to dissolve only a portion of the chlorine therein. No. 2,447,834. Frederick R. Balcar (to Air Reduction Co., Inc.).

Phosphor consisting of zinc fluoride and columbium activator. No. 2,447,-927. Ferd E. Williams (to Radio Corp. of America).

Anode for an electron tube, comprising a metallic body, and a surface layer comprising an intimate admixture of zirconium carbide and uncombined zirconium. No. 2,447,973. Paul D. Williams (to Eitel-McCullough, Inc.).

In making an alkaline earth metal, the method which comprises mixing oxide of the alkaline earth metal to be made with aluminum as reducing agent and a mixture consisting of aluminum nitride, carbide and oxide, heating the whole mixed mass to furnace temperature of at least approximately 2000° F., to cause reduction, and distilling in vacuo and condensing. No. 2,448,000. Frank R. Kemmer (to Reynolds Metals Co.).

Manufacture of sodium percarbonate by reacting sodium carbonate and hydrogen peroxide. No. 2,448,058. Victor Wallace Slater and William Stanley Wood (to B. La Porte Ltd.).

Manufacturing superphosphate comprising mixing finely divided phosphate rock with an acid selected from the group consisting of sulphuric acid, phosphoric acid and a mixture of sulphuric and phosphoric acids and with a coarse fraction of superphosphate fines to form a thick slurry, discharging the slurry onto a conveyor belt coated with fine superphosphate fines, discharging the slurry together with the fine fines into a conditioning and nodulizing zone, nodulizing the mixture of slurry and fine fines, drying and cooling. No. 2,448,126. Mark Shoeld (to The Davison Chemical Corp.).

Separating potassium chloride from carbonate by providing a solution of the crude carbonate evaporating to crystallize out potassium carbonate sesquihydrate, recovering said sesquihydrate, dissolving sodium carbonate in the resultant mother liquor in such an amount that on cooling potassium chloride crystallizes from the solution and the double salt $NaKCO_3$ formed remains in solution, and recovering the crystallized potassium chloride. No. 2,448,191. Robert D. Pike.

Process for converting cuprous copper to cupric copper which comprises contacting hydrogen chloride in admixture with an oxygen-containing gas with a fluid melt initially consisting before said contacting of substantially 30 to 50 mol % cuprous chloride, 15 to 25 mol % lead dichloride, and 25 to 45 mol % alkali metal chloride. No. 2,448,255. Aldo De Benedictis and Daniel B. Luten, Jr. (to Shell Development Co.).

Heat treating a gel containing a major proportion of silica and a minor proportion of alumina at about 1800° F. for about 4 hours, whereby the gel is caused to pass through a stage of expansion and thereafter fracture and expand further, reaching a condition of constant volume. No. 2,448,270. Milton M. Marisic (to Socony-Vacuum Oil Co., Inc.).

Manufacture of a cellular mass which comprises forming a hydrosol of inorganic oxide having the inherent properties of setting to a hydrogel without change in chemical composition after the lapse of a period of time and of passing through a viscous state just prior to gelation spraying said viscous sol against a solid surface in a forming zone, said forming zone being at a temperature in excess of the boiling point of said sol at the pressure of said forming zone; whereby the water content of said hydrosol is vaporized, expanding the drops of the hydrosol spray to bubbles which form a foamy mass and set to firm hydrogel. No. 2,448,280. Edmund L. Sargent and Robert C. Wilson, Jr. (to Socony-Vacuum Oil Co.).

A battery oxide consisting essentially of particles ranging in median radius from approximately 3 to 6 microns, said particles having a core of fused litharge and said particles having a coating of Pb_3O_4. No. 2,448,353. Melvin F. Chubb (to The Eagle-Picher Co.).

Utilization of ferrous sulfate solutions in the manufacture of ferric alumns. No. 2,448,425. Charles B. Francis.

Preparing silica hydrogel in spherical form by mixing sodium silicate and sulfuric acid to form a sol, having a density of 1.21, suspending spherical droplets of said sol in a mineral oil containing sufficient acetylene tetrabromide to raise the density of the oil to 1.18, passing said suspended sol downwardly through said oil until said sol sets to silica hydrogel spheres, and removing said hydrogel spheres from said

oil by dropping into an aqueous solution of sulfuric acid having a density of 1.19. No. 2,448,439. Charles N. Kimberlin, Jr. and Jerry A. Pierce (to Standard Oil Development Co.).

Preparing inorganic hydrogel particles in spherical form directly from the initial sol-forming components which comprises agitating an emulsion of one of said sol-forming components in a liquid capable of forming a separate layer in contact with water, adding to said emulsion during said agitation another component capable of forming a sol with said emulsified component whereby said sol is produced in the form of minute droplets suspended in said liquid and containing said agitation for a sufficient length of time to cause said sol to set to a hydrogel. No. 2,448,460. Jerry A. Pierce and Charles N. Kimberlin, Jr. (to Standard Oil Development Co.).

Forming uranium monocarbide from an oxide of uranium and carbon. No. 2,448,479. Harley A. Wilhelm and Adrian H. Daane (to the U. S. A. by the U. S. Atomic Energy Comm.).

Making a photoconductive resistance element by depositing lead sulfide upon a surface by evaporation and condensation and subjecting the lead sulfide during or after deposition to limit quantities of oxygen. No. 2,448,516. Robert J. Cashman (to Northwestern University).

Activating thallous sulphide which consists in forming a deposit of thallous sulphide on a surface, and causing it to have a limited reaction with oxygen in the presence of a catalyst. No. 2,448,518. Robert J. Cashman (to Northwestern University).

Production of a stable colloidal solution of a metal sulfide, which comprises decomposing a member selected from the group consisting of the ammonium thio-salts of As, Mo, Sb, Sn, Pt and Au, by reacting the same in aqueous solution with a member selected from the group consisting of water-soluble aldehydes and water-soluble ketones. No. 2,448,740. Fernand Frederic Schwart.

Preparing a catalyst adapted for the conversion of hydrocarbon oils, which comprises intimately mixing solid aluminum hydrate with a gelatinous hydrous oxide of silicon and with sulfuric acid, thereafter drying the acid-treated mixture to an extent sufficient only to concentrate the acid substantially and to form aluminum sulfate, adding a volatile base to the partially dried mixture, and thereafter washing and drying the resulting product. No. 2,448,960. Gerald C. Connolly (to Standard Oil Development Co.).

Manufacturing metal salts of the products resulting from the reaction of a sulfur halide with alkylated hydroxy aromatic compounds, which comprises neutralizing the reaction product in a mineral lubricating oil solution with a controlled amount of a basic metal compound, thereafter contacting with carbon dioxide and water vapor and finally filtering the same. No. 2,449,026. Carll F. Van Gilder (to Standard Oil Development Co.).

Producing SO_3 comprising injecting a material from the group consisting of sulfur, waste sulfuric acid, and mixtures thereof into a reaction zone, introducing solid particles of a vanadium oxidation catalyst and air into said zone to maintain a catalyst bed in fluidized suspension, removing a stream of catalyst from said zone, cooling the removed catalyst stream, and returning at least a portion of the cooled catalyst stream with additional air. No. 2,449,190. Arnold Belchetz (to Stauffer Chemical Co.).

Manufacture of hollow inorganic oxide gel spheroids by forming a hydrosol of inorganic oxide having the inherent properties of setting to a hydrogel without change in chemical composition after the lapse of a period of time and of passing through a viscous state just prior to gelation, injecting said viscous sol at a temperature in excess of its boiling point at the pressure existing in the medium hereinafter defined and during the said viscous state as a plurality of drops into a fluid medium maintained at a temperature in excess of said boiling point and at a pressure below the vapor pressure of said sol at the time of injection as aforesaid; whereby the water content of said hydrosol is vaporized, expanding the drops to hollow spheroids and gelled in that form. No. 2,449,253. Edmund L. Sargent (to Socony-Vacuum Oil Co.).

Production of magnesium compounds from an impure hydrous slurry containing one or more magnesium compounds from a group comprising magnesium oxide and magnesium hydroxide. No. 2,449,293. Gunter H. Gloss and Edgar B. Baker (to Marine Magnesium Products Corp.).

Preparation of catalysts suitable for use for dehydrogenation and dehydrocyclization reactions and particularly adapted to be employed in an autoregenerative manner which comprises the steps of forming a coprecipitated mixture of hydrous oxides comprising a hydrous reducible oxide of a metal selected from the group consisting of iron and cobalt and alumina, said precipitated hydrous oxides being formed from dilute solution in the presence of sulfate ion and impregnated with a compound of potassium convertible to the oxide by heat. No. 2,449,295. Carlos L. Gutzeit (to Shell Development Co.).

Canadian

Removing impurities from alkaline gelatinous hydroxides by washing the hydroxide with water, adding an acid to the hydroxide in an amount insufficient to peptize the hydroxide, partially drying, and subsequently washing. No. 451,020. August Henry Riesmeyer and Vernon Monroe Stowe (to Aluminum Co. of America).

Ammonium thiocyanate by reacting carbon bisulfide and ammonia in the presence of a reaction diluent comprising an aliphatic alcohol which will solubilize the carbon biculfide and a catalyst chosen from the group consisting of a fatty acid and the ammonium salts thereof, and heat-converting the dithiocarbamate to thiocyanate. No. 451,022. Louis L. Lento, Jr. and David W. Jayne, Jr. (to American Cyanamid).

Preparation of an alkali metal chlorosulfonate by reacting a finely ground alkali metal chloride, moving in a continuous stream, while stirring, with sulfur trioxide flowing in countercurrent. No. 451,024. Nopoleon Arthur Laury (to American Cyanamid Co.).

Preparing acidic complex hydrous silicates capable of forming gels and films by contacting an aqueous slurry of salts of said silicates which swell and disperse in water with an insoluble cation exchanger in its hydrogen form and separating the exchanger from the silicate. No. 451,115. Loren C. Hurd and William L. Van Horne (to Rohm & Haas Co.).

In the process of purifying hydrochloric acid gas containing free chlorine as an impurity, the step comprising catalytically reacting said chlorine with carbon monoxide in the presence of water vapour whereby said chlorine is reduced to HCl. No. 451,172. Walter S. Allen (to General Chemical Co.).

Simultaneous generation of chlorine dioxide and nitrogen trichloride by contacting a material from the group consisting of mixtures of chlorates and ammonium compounds and single compounds containing both a chlorate radical and an ammonium radical with hydrogen chloride. No. 451,230. Willis S. Hutchinson (to The Mathieson Alkali Works).

Preparing an improved catalyst of the type in which a metal halide capable of catalyzing the Friedel-Crafts syntheses is deposited upon a porous carrier, which comprises subjecting the carrier to a treatment capable of converting polyvalent metal compounds in a lower state of valency into the metal compounds in the highest state of valency of said metals. No. 451,384. H. G. Corneil (to Standard Oil Development).

A dispersion of particles of metallic sodium in an inert liquid having a boiling point above the melting point of sodium and containing a small amount of a higher fatty acid. No. 451,461. Virgil Leland Hansley (to Candian Industries Ltd.).

In a process wherein sodium nitrate is crystallied from an aqueous solution in a body of slurry containing said solution that improvement which comprises maintaining in said body of slurry during crystallization therein of sodium nitrate at least 50% apparent volume of solid sodium nitrate, agitating said body of slurry to maintain the crystals therein in intimate contact with the solution from which sodium nitrate is crystallized, withdrawing from said body of slurry a mixture of large and small crystals formed therein, subjecting said withdrawn mixture to a wet classification in the presence of said solvent and thereby dividing said mixture into a fine crystal fraction and a large crystal fraction, redissolving in said solvent crystals contained in said fine crystal fraction and returning the resulting liquor to the aforesaid slurry, returning to said slurry a portion of the large crystal fraction of said classification and withdrawing another portion of said large crystal fraction as product. No. 451,597. Herman A. Beekhuis, Jr. (to The Solvay Process Co.).

Polishing members whose surfaces are composed of silver by immersing the members in alkaline aqueous cyanide solution and containing a readily ionizable alkaline compound in an amount sufficient to provide for good electrical conductivity. No. 451,204. Dennis R. Turner (to Canadian Westinghouse Co., Ltd.).

Medicinal

Therapeutic composition comprising a hexahydric alcohol hexanitrate, a desensitizing agent, a xanthine derivative and a member of the group consisting of nicotinic acid and salts thereof. No. 2,446,916. Louis Freedman (to U. S. Vitamin Corp.).

Penicillin-protein reaction product. No. 2,446,974. Bacon F. Chow (to E. R. Squibb & Sons).

Aluminum hydroxide antacid composition. No. 2,446,981. Frederick Constant Ninger (to Vick Chem. Co.).

Stable medicinal salts of acetylsalicylic acid. No. 2,447,396. Myer Coplans.

Extracting antidiabetic substance from pancreas with a mixture of alcohol and hydrochloric acid. No. 2,449,076. Carl Ludwig Lautenschlager and Fritz Lindner (vested in Attorney General of U. S. A.).

In a process for manufacturing a vitamin concentrate including the steps of synthesizing riboflavin by fermenting with Clostridium Acetobutylicum a material selected from the group consisting of skim milk and whey, the improvement comprising providing said material in a form containing from about 0.56 to about 2.24 parts per million of iron in excess over the natural 0.1 to 0.21 part per million iron content of said material and incorporating a soluble ammonium salt with said material, the amount of soluble ammonium salt being so adjusted as to provide from about 1 to about 5 parts per million of ammonium radical. No. 2,449,140. Henry L. Pollard, Nelson E. Rodgers and Reginald E. Meade (to Western Condensing Co.).

Production of riboflavin by fermentation processes from the group consisting of whey and skim milk by adding a soluble magnesium salt. No. 2,449,141. Henry L. Pollard, Nelson E. Rodgers and Reginald E. Meade (to Western Condensing Co.).

In a process of manufacturing a vitamin concentrate including riboflavin by fermenting a lactose-containing lacteal material with Clostridium Acetobutylicum in the presence of a soluble iron compound, the improvement comprising incorporating with said material from 0.15 to 3.5 parts per million of zinc in the form of a soluble zinc salt. No. 2,449,142. Henry L. Pollard, Nelson E. Rodgers and Reginald E. Meade (to Western Condensing Co.).

In the process of manufacturing a vitamin concentrate including riboflavin by fermenting a lactose-containing lacteal material with Clostridium Acetobutylicum in the presence of from 0.5 to less than 4.5 parts per million of iron, the improvement comprising incorporating with said material from 0.05 to 20 parts per million of manganese in the form of a soluble manganese salt. No. 2,449,143. Henry L. Pollard, Nelson E. Rodgers and Reginald E. Meade (to Western Condensing Co.).

Bacteriocidal composition comprising a basteriocidal quaternary ammonium compound and a fluorescent indicating agent quenched therein and responsive at a predetermined reduced bacteriocial strength to change the visual aspect of the composition, said indicating agent being selected from the group consisting of fluorescein and uranine. No. 2,449,274. Harry R. Broll (to Fuld Bros. Inc.).

Stable, water-soluble anti-vesicant useful as an anti-vesicant and in arsenic and cadmium therapy consisting of a derivative of 2,3-dimercaptopropanol in which at least one mercapto hydrogen is replaced by the group $—CH_2—NR—COR'$ wherein R is a radical selected from the group consisting of hydrogen and a hydrocarbon radical, and R' is a hydrocarbon radical. No. 2,449,332. Frank K. Signaigo (to U. S. A. as repres. by Secretary of War).

Metals, Ores

Zinc distillation retort. No. 2,447,369. Herbert C. Schweitzer (to The American Metal Co.).

Alloy comprising germanium impregnated with helium, the alloy being characterized by exhibiting the electrical property of high resistance to current flow in one direction therethrough and low resistance to current flow in the other direction therethrough. No. 2,447,829. Randall M. Whaley (to Purdue Research Foundation).

Hot workable chromium-nickel stainless steel, essentially consisting of 12% to 22% chromium, 10% to 21% nickel, 0.10% to 2% manganese, 2% to 4% molybdenum and 2% to 4% copper, 0.01% to 0.15% carbon, 0.15% to 0.75% titanium, 0.20% to 1.10% columbium and the remainder substantially all iron. No. 2,447,897. William Charles Clarke, Jr. (to Armco Steel Corp.).

Preparing active material for the cadmium negatives of alkaline cells by adding an aqueous solution of a cadmium salt and a solution of a cellulose ester in an organic solvent to a solution of an alkali metal hydroxide to form a coprecipitate of cadmium hydroxide and a cellulosic compound and reducing the cadmium compound to free metal. No. 2,448,052. Ralph Roberts.

Zinc base alloy characterized by high creep resistance and containing from 0.05 to 0.5% titanium, from 0.1 to 1% cadmium, and the balance zinc with not more than 0.1% lead as an impurity. No. 2,448,169. Edward J. Boyle and Edmund A. Anderson (to The New Jersey Zinc Co.).

Process for removing oxide from the surface of a metal article compatible with fused alkali metal hydroxide which comprises electrolyzing a bath of fused alkali metal hydroxide with said article as cathode, separating the anode and cathode with a diaphragm, dissolving and maintaining 0.5 per cent to 10 per cent by weight of alkali metal hydride in said bath in the vicinity of the cathode and dissolving alkali metal monoxide in said bath in the vicinity of the anode. No. 2,448,262. Harvey N. Gilbert (to E. I. du Pont de Nemours & Co.).

Production of a chromium alloy containing less than 2% iron from natural iron and chromium ore, which comprises melting said ore and reducing it by metallic chromium in the presence of lime, thereby producing on the one hand an overlying layer of molten slag having a chromium oxide content higher than that in said ore and an iron content lower than that in said ore and on the other hand an underlying layer of molten-ferro-chromium, separating the layer of molten ferro-chromium from the layer of molten slag, allowing the slag to freeze, thereafter crushing it and submitting it to a magnetic sorting operation to remove ferro-chromium dispersed in the slag, and submitting this deironed slag to a reduction operation. No. 2,448,882. André Greffe (to Societe D'Electro-Cheimie.).

High expansion austenitic steel containing carbon, manganese, chromium, nickel, copper, silicon, a small proportion of a carbide forming element taken from the group consisting of vanadium, tungsten, titanium and columbium, the remainder being substantially all iron. No. 2,449,023. Alfred Everett Thornton (to Thos. Firth & John Brown Ltd.).

Electrodeposition of nickel. No. 2,449,422. Leslie N. Smith (to Harshaw Chemical Co.).

Treating members of non-ferrous metal selected from the group of metals consisting of zinc, cadmium and alloys in which zinc and cadmium predominate, in an aqueous acidic phosphate solution containing dissolved iron to provide for applying protective phosphate coatings containing iron on the members. No. 2,449,495. John C. Lum (to Westinghouse Electric Corp.).

Canadian

Producing a heat-treatable copper-base alloy by adding chromium or a chromium-copper master alloy to a copper melt. No. 451,216. John Sykes (to Enfield Rolling Mills Ltd.).

High-duty copper-base alloy consisting of silver, oxygen, cobalt, and copper. No. 451,217. John Sykes (to Enfield Rolling Mills Ltd.).

Producing zinc from its sulphide ores by reaction with calcium carbide. No. 451,294. Louis Jean Henri Hackspill.

Producing metal from aqueous electrolytes containing the metal which includes depositing the metal electrolytically onto a flash sintered, porous cathode formed of the metal. No. 451,479. Clarence W. Balke (to Fansteel Metallurgical Corp.).

Laminated solder comprising a central lamination of a metal substantially infusible at soldering temperatures selected from the group consisting of steel, nickel, monel, nickel silver and chrome iron and a surface coating on each side of said central lamination comprising at least two metals which when fused together form a solder alloy selected from the group consisting of silver, copper and zinc. No. 451,495. Ermand H. Davignon (to Metals & Controls Corp.).

Producing electrolytic iron from aqueous electrolytes containing iron which includes depositing the iron onto a cathode formed of a metal selected from the group consisting of columbium, tantalum, molybdenum and tungsten. No. 451,638. C. W. Balke (to Fansteel Metallurgical).

Preparing iron for powder metallurgy purposes which comprises providing an iron containing electrolyte containing dissolved chlorides, subjecting the electrolyte to electrolysis to form an iron deposit, reducing the deposited iron to powder form and subjecting the powder at a temperature of from about 700°C to about 950°C to the action of hydrogen for a sufficient period of time so as to remove a substantial proportion of the chlorine. No. 451,639. Clarence W. Balke (to Fansteel Metallurgical Corp.).

Alloy characterized by high heat and stress resistance comprising cobalt, chromium, nickel, copper, molybdenum, iron, and boron. No. 451,647. Peter Forbes Blackwood (to Ford Motor Co. of Canada, Ltd.).

Alloy characterized by high heat and stress resistance comprising a basic combination of Co, Cr, Ni, Mo, Cu, Fe, B, Cb, V, T, Zr, Ta, W, and Mn. No. 451,648. Peter Forbes Blackwood (to Ford Motor Co. of Canada, Ltd.).

Electrodepositing copper by electrodepositing copper from an aqueous solution of copper sulphate and sulfuric acid, there being added to such solution as a brightening agent a colloidal sulfonated reaction product of benzene and a sulfurizing agent. No. 451,659. John A. Henricks (to Houdaille-Hershey Corp.).

In the refining of magnesium-base lithium alloy with a flux the step which comprises agitating the alloy with a flux consisting of lithium chloride and fluoride having the capacity to absorb sodium from the alloy, and absorbing in the flux sodium from the alloy to an extent leaving not more than 0.1% of sodium in the alloy. No. 451,667. Alfred H. Hesse (to The Mathieson Alkali Wks.).

Concentrating phosphate minerals from their ores, which comprises subjecting the ore in an aqueous pulp to a concentrating operation with negative-ion reagents to separate a rougher floating concentrate of the phosphate values mixed with siliceous gangue, conditioning an aqueous pulp of that rougher phosphate concentrate with a mineral acid and then dewatering said pulp thereby eliminating a large part of said mineral acid and also the agents used in the production of that rougher phosphate concentrate, adding an inert oil to an aqueous pulp of that acid-treated rougher phosphate concentrate and subjecting said pulp to a concentrating operation resulting in the removal and saving of a high-grade floating concentrate of a part of the phosphate values, subjecting the residue of that operation in an aqueous pulp to a concentrating operation with added positive-ion reagents to remove and discard a floated material largely composed of siliceous gangue, and combining the residue from that operation with the previously mentioned high-grade phosphate concentrate, thereby producing a final high-grade phosphate concentrate containing a high proportion of the phosphate in the ore. No. 451,673. James B. Duke (to Minerals Separation North American Corp.).

Method of substantially eliminating from a rougher concentrate of a phosphate ore the effect of the negative-ion agents used in the production of said concentrate, which comprises passing said rougher concentrate in an aqueous pulp containing a mineral acid through a tank in which said pulp is agitated and aerated and from which said pulp is removed without removing any froth which forms on the surface of the pulp thereby permitting said froth to remain there until the effect of the negative-ion agents is eliminated from the phosphate particles in said froth and they sink into the body of said pulp. No. 451,674. Ernest W. Greene and James B. Duke (to Minerals Separation North American Corp.).

Nuclear Processes

Molecular distillation process and apparatus for the separation of isotopes. No. 2,446,997. Aubrey Keith Brewer and Samuel Leo Madorsky (to U. S. A. represented by U. S. Atomic Energy Comm.).

Organic

Preparing aminophenols by reducing a nitroaromatic compound with aluminum and an aqueous solution of an acid selected from the group consisting of sulfuric acid, phosphoric acid and hydrochloric acid. No. 2,446,519. Frederic R. Bean (to Eastman Kodak Co.).

Diaryl nitrogenous heterocylic alkylene compounds. No. 2,446,522. Max Bockmuhl, G. Ehrhart, O. Eisleb and L. Stein (to Winthrop-Stearns).

Ethers of 1-(3,4-dihydroxy-cyclo-hexyl)-1,2-dihydroxy-butanone. No. 2,446,570. Joseph E. Bludworth and Donald P. Easter (to Celanese Corp. of America).

Production of vanillic acid from an aldehyde in the presence of excess alkali and suspended silver oxide. No. 2,446,606. Irwin A. Pearl (to Sulphite Products Corp.).

N-substituted pantoyl amides. No. 2,446,615. William Shive and Esmond Emerson Snell (to Research Corp.).

3-amino steroids. No. 2,446,538. Percy L. Julian, John W. Cole, Arthur Magnani and Edwin W. Meyer (to Glidden Co.).

Preparation of alpha-amino-beta-hydroxy aliphatic carboxylic acids by reacting a member of the group consisting of the lower alkyl esters of the alpha-halo-beta-hydroxy three- and four-carbon-atom aliphatic carboxylic acids with an amine having the formula $ArCH_2NH_2$, Ar being an aryl radical, hydrolyzing the resulting ester to the correspounding carboxylic acid. No. 2,446,651. Walter H. Hartung.

Refining toluene with toluene sulfonic acid. No. 2,446,679. Francis T. Wadsworth, Robert J. Lee and Preston L. Brandt (to Pan American Refining Corp.).

Furfural purification by removing furfural polymers which comprises extracting the contaminated furfural in liquid-liquid manner with an aliphatic hydrocarbon. No. 2,446,728. George Thodos (to Phillips Petroleum Co.).

Substituted pyridinium and piperidinium compounds. No. 2,446,792. Robert S. Shelton and Marcus G. Van Campen, Jr. (to Wm. S. Merrell Co.).

Substituted pyridinium and piperidinium compounds. No. 2,446,793. Robert S. Shelton and Marcus G. Van Campen, Jr. (to Wm. S. Merrell Co.).

Substituted pyridinium and piperidinium compounds. No. 2,446,796. Marcus G. Van Campen, Jr. and Robert S. Shelton (to Wm. S. Merrell Co.).

Production of organic halogen-containing peroxides which comprises reacting a vaporous mixture comprising oxygen and a halogen-substituted saturated hydrocarbon in the presence of hydrogen bromide. No. 2,446,797. William E. Vaughan and Frederick F. Rust (to Shell Development Co.).

Manufacture of heterocyclic bases by hydrogenation in the presence of a hydrogenation catalyst. No. 2,446,803. Franz Bergel, Alexander Lang Morrison and Heinrich Rinderknecht (to Hoffmann-La Roche, Inc.).

3-aryl-3-carbalkoxy piperidines and pyrrolidines. No. 2,446,804. Franz Bergel, Alexander Lang Morrison, and Heinrich Rinderknecht (to Hoffmann-La Roche Inc.).

Oxidation of fatty substances with a hexavalent chromium compound in the presence of an oxidation-resistant mineral acid. No. 2,446,849. Donald Price and Francis J. Sprules (to Nopco Chem. Co.).

Producing nicotinamide by heating 3-cyano-pyridine in the presence of water and an organic amine. No. 2,446,957. Hans R. Rosenberg (to E. I. du Pont de Nemours & Co.).

Guanamines by reacting a biguanide salt with a compound included in the group consisting of carboxylic acid anhydrides and carboxylic acid chlorides in the presence of aqueous caustic alkali and acetone. No. 2,446,980. Daniel Elmer Nagy (to American Cyanamid Co.).

Manufacturing carbon disulfide by preparing a mixture of a hydrocarbonaceous substance with elemental sulfur, calcining, and then contacting additional sulfur vapors. No. 2,447,003. Bernard Wm. Gamson (to Great Lakes Carbon Corp.).

Refining polymerized rosin by heating with iodoform. No. 2,447,009. Burt L. Hampton (to The Glidden Co.).

Diaminocresol by hydrolyzing a symmetrical triaminotoluene hydrochloride in an aqueous-hydrochloric acid medium. No. 2,447,019. John Krueger and Robert Lenhart Hayes (to The Edwal Laboratories, Inc.).

Diaminophenol by hydrolyzing a hydrochloride of symmetrical triaminobenzene with an aqueous-hydrochloric acid solution. No. 2,447,020. John Krueger and Robert Lenhart Hayes (to The Edwal Laboratories).

Diphenylamine by heating aniline in the presence of ferric chloride. No. 2,447,044. Alfred B. Wester, Lawton A. Burrows and Winford B. Johnson (to E. I. du Pont de Nemours & Co.).

Methyl ether of 1-cyclohexyl-butanol-3. No. 2,447,050. Joseph E. Bludworth and Donald P. Easter (to Celanese Corp. of America).

Water-insoluble aluminum salts of organic carboxylic acids. No. 2,447,064. Arthur Ira Gebhart and John Ross (to Colgate-Palmolive-Peet Co.).

2-(p-acetoxyphenyl)-3-ethyl-6-methoxyindene. No. 2,447,099. Ulrich Volckmar Solmssen (to Hoffmann-La Roche, Inc.).

Halocycloalkanes by reacting a napthenic hydrocarbon and an alkyl halide in the presence of a catalytic solution. No. 2,447,139. Louis Schmerling (to Universal Oil Products Co.).

Derivatives of pyrazine by heating lumazine and an alkali metal hydroxide in aqueous solution. No. 2,447,148. John Weijlard and Max Tishler (to Merck & Co., Inc.).

Guanamine compounds. No. 2,447,175. Adolf Grün, deceased, by Franz Grün (to J. R. Geigy A.G.).

Guanamine compounds. No. 2,447,176. Adolph Grün, deceased, by Franz Grün (to J. R. Geigy A.G.).

Ganamine compounds. No. 2,447,177. Adolf Grün, deceased, by Franz Grün (to J. R. Geigy A.G.).

Silica-magnesia catalyst for converting ethanol to butadiene. No. 2,447,181. Darrel J. Butterbaugh and Le Roy U. Spence (to Röhm & Haas Co.).

Producing lower alkyl esters by reacting a higher fatty acid glyceride or a higher fatty acid with a lower alcohol. No. 2,447,186. Robert Gardner King and Robert Joshua King (to The Photo Technical Corp.)

Tetrahydropyrane-4:4-dicarboxylic acid bis-diethylamide. No. 2,447,194. Henry Martin and H. Zaeslin, Hans Gysin and Alfred Margot (to J. R. Geigy A.G.).

Diamides of alkane dicarboxylic acids. No. 2,447,195. Henry Martin and Hans Gysin, H. Zaeslin and Alfred Margot (to J. R. Geigy A.G.).

Diamides of methane-1:1-dicarboxylic acids. No. 2,447,196. Henry Martin and H. Gysin, H. Zaeslin and A. Margot (to J. R. Geigy A.G.).

Optically active salts of the lysergic and isolysergic acid derivatives. No. 2,447,214. Arthur Stoll and Albert Hofmann (to Sandoz Ltd.).

Recovery of nicotinic acid from dilute solutions by oxidizing nicotine to nicotinic acid nitrate with nitric acid, in an alkaline solution, acidifying and purifying. No. 2,447,234. Russell Tattershall Dean and Victor L. King and Napoleon Arthur Laury (to American Cyanamid Co.).

Primary aliphatic amine salts of dialiphatic substituted mono-thiophosphoric acids. No. 2,447,288. Herschel G. Smith, Troy L. Cantrell and Mark L. Hill (to Gulf Oil Corp.).

Propylenepolymer with aluminum bromide catalyst. No. 2,447,313. Don R. Carmody and Lorld G. Sharp (to Socony-Vacuum Oil Co., Inc.).

3,11-oxygenated steroids. No. 2,447,325. Thomas F. Gallagher (to Research Corp.).

Recovery of fluosulfonic acid from spent acid formed in the manufacture of 2,2-bis(p-chlorphenyl)-1,1,1-trichloroethane by reaction of chloral with mono-chlorobenzene. No. 2,447,326. Charles W. Gates and William P. Woods (to U. S. Rubber Co.).

dl-N-Cyclohexylacetylserine hexahydrobenzyl amide. No. 2,447,361. Robert L. Peck, Stanton A. Harris, Ralph Mozingo, Donald E. Wolf and Karl Folkers (to Merck & Co., Inc.).

Antipressor composition consisting of the compound of urobilinogen with hippuric acid. No. 2,447,363. Harold M. Rabinowitz.

Carbamyl chloride by reacting phosgene with ammonia. No. 2,447,372. Robert J. Slocombe and Edgar E. Hardy.

Morpholine substituted esters. No. 2,447,395. Lee C. Cheney and William G. Bywater (to Parke, Davis & Co.).

Acetophenone by contacting isopropylbenzene with gaseous oxygen in the presence of an oxidation catalyst consisting of calcium hydroxide. No. 2,447,400. William S. Emerson and Josef W. Heyd (to Monsanto Chemical Co.).

Pyrolysis of carbon chlorides. No. 2,447,410. Clifford Allen Hampel (to Mathieson Chemical Corp.).

Oxidation of isopropylbiphenyl in the presence of an oxidation catalyst consisting of calcium hydroxide to yield phenyl acetophenone. No. 2,447,414. Milton Kosmin and William S. Emerson (to Monsanto Chemical Co.).

Diphenylacetonitrile by reacting benzaldehyde cyanohydrin with benzene. No. 2,447,419. Jack Mills (to Eli Lilly and Co.).

Production of carbon monoxide in a vertical cupola furnace provided with electrodes. No. 2,447,426. John August Benjamin ödberg.

Destructive distillation of cashew nut shell liquid. No. 2,447,432. William F. Schaufelberger (to The Harvel Corp.).

Amino substituted aryl guanamines. No. 2,447,440. Jack Theo Thurston to American Cyanamid Co.).

2-Acetonylazoles by heating diketene with an aromatic primary amine. No. 2,447,456. Alfred W. Anish and Charles A. Clark (to General Aniline & Film Corp.).

Regeneration of steroid ketones. No. 2,447,463. Emanuel B. Hershberg (to Schering Corp.).

6-(alpha-ethylpropyl)-2-thiouracil. No. 2,447,465. Wilbur H. Miller (to American Cyanamid Co.).

Recovery of fluosulfonic acid and use as condensing agent in production of DDT. No. 2,447,476. Marshall Kulka (to U. S. Rubber Co.).

Separation of ethyl benzene from xylenes. No. 2,447,479. Francis Edward Salt (to The Distillers Co., Ltd.).

Synthesizing aliphatic mercaptans and sulfides from hydrogen sulfide and olefinic hydrocarbons. No. 2,447,481. Richmond T. Bell and Carlisle M. Thacker (to The Pure Oil Co.).

1,2-dichloro-1,2-difluoro-1,2-dinitroethane. No. 2,447,504. Henry B. Hass and Arthur Charles Whitaker (to Purdue Research Foundation).

Preparing 2,4,5-triamino-6-hydroxy-pyrimidine which comprises reacting 2,4-diamino-5-nitroso-6-hydroxy-pyrimidine with hydrogen. No. 2,447,523. Ralph Mozingo and Gunther S. Fonken (to Merck & Co., Inc.).

Synthesis of tryptophane by condensing a 3-amino-methyl indole compound with an unsubstituted ring nitrogen and having tertiary N-substituents from the class consisting of alkyl, aryl, and aralkyl groups and groups wherein the substituents form part of a N-heterocyclic radical with an acylamidomalonic ester having an active hydrogen on the central carbon atom, thereby forming the corresponding ester of α-acylamido-α-carboxy-β-(3-indole)-propionic acid. No. 2,447,544. Harold R. Snyder and Eugene E. Howe and Arthur J. Zambito (to Merck & Co., Inc.).

Synthesis of tryptophane. No. 2,447,545. Harold R. Snyder and Curtis W. Smith (to Merck & Co., Inc.).

Reacting an acyl halide and a saturated hydrocarbon containing at least one tertiary carbon atom per molecule in the presence of a Friedel-Crafts catalyst to convert said acyl halide into an aldehyde and said saturated hydrocarbon into a halogenated hydrocarbon having the same number of carbon atoms per molecule as said hydrocarbon. No. 2,447,565. Joseph A. Chenicek (to Universal Oil Products Co.).

Preparation of a cycloalkanone oxime having from 4 to 10 ring carbon atoms comprising reacting a cycloalkanone-bisulfite addition compound with a compound selected from the class consisting of nitrous acid and alkali metal salts thereof. No. 2,447,583. Theodoor Koch (to American Enka Corp.).

Improvement in the method of separating non-filterable ash-producing material from commercial nitro-aromatics, which comprises adding to said nitro-aromatics a small quantity of a solid water-soluble drying inorganic salt. No. 2,447,585. Ralph Burgess Mason (to Standard Oil Development Co.).

Acyl glycine amides. No. 2,447,587. Henry Martin and Hans Gysin (to J. R. Geigy A. G.).

Producing primary halogenated hydrocarbons which comprises reacting an olefin, halogenated in a primary position, with an isoparaffin in the presence of a catalyst consisting of halosulfonic acid. No. 2,447,593. John C. Munday (to Standard Oil Development Co.).

Producing methylated aromatic hydrocarbons by subjecting an aromatic hydrocarbon to contact with a methylating agent in the presence of a catalyst containing as its active ingredient an acid-acting compound of phosphorus. No. 2,447,599. Louis Schmerling (to Universal Oil Products Co.).

Production of a nitrile of an unsaturated carboxylic acid by mixing a substantially anhydrous conjugated diolefin hydrocarbon with substantially anhydrous hydrogen cyanide and passing the resulting mixture of vapors over a substantially anhydrous cuprous salt. No. 2,447,600. Walter A. Schulze and John E. Mahan (to Phillips Petroleum Co.).

Mono-nuclear aromatic hydrocarbon amine stabilized against discoloration by diethylene triamine. No. 2,447,615. Allen R. Jones (to Standard Oil Development Co.).

A new composition of matter, ROOC-COOR, where R is a sulfurized unsaturated aliphatic hydrocarbon radical containing at least 6 carbon atoms. No. 2,447,619. Dilworth T. Rogers and John G. McNab (to Standard Oil Development Co.).

β-Diketones and process for preparing them. No. 2,447,626. Carl T. Bahner.

In the production of diamines the process which comprises causing a reaction in the presence of a basic catalyst between formaldehyde, a 1-nitroalkane containing more than one carbon atom and a primary phenyl amine selected from a class consisting of phenyl amine and phenyl amines which are substituted in the nucleus with substituents which are non-reactive during the following condensation reaction. No. 2,447,653. Harold G. Johnson (to Commercial Solvents Corp.).

Manufacturing an ester of an hydroxy carboxylic acid comprising heating a mixture containing a hydroxy carboxylic acid selected from the group consisting of glycolic acid and lactic acid and an aliphatic, polyhydric alcohol containing not more than three hydroxyl groups, in the presence

of an acid catalyst, and reacting the said condensation product with an alkenol having not more than 6 carbon atoms in the presence of an acid catalyst. No. 2,447,693. Edward M. Filachione and Charles H. Fisher (to the U. S. A. by the Secretary of Agriculture).

Producing benzolsulfonamido-1,3,4-thiodiazole compounds. No. 2,447,702. Oluf Hübner (to H. Lundbeck & Co., Kemisk Pharmaceutisk Laboratorium A/S).

Reacting a diacyl-glycerophosphoryl chloride, wherein the acyl radicals are aliphatic and contain at least 8 carbon atoms, with beta-hydroxyethylphthalimide in the presence of a tertiary amine, subjecting the resulting phthalimidoethyl ester of diacyl-glycero-monochlorophosphoric acid to limited hydrolysis by reaction with water to form the phthalimidoethyf ester of diacyl-glycerophosphoric acid, and refluxing this last-formed ester with a member selected from the group consisting of hydrazine, hydrazine hydrate, and the mineral acid salts of hydrazine to produce an aminoethyl ester of a diacyl-glycerophosphoric acid. No. 2,447,715. William Gordon Rose (to the U.S.A. by the Secretary of Agriculture).

In a process of producing organic fluorine compounds, the steps which comprise reacting fluorine, with a fluorinatable organic compound solute in a substantially inert liquid solvent diluent of the class consisting of pyridine and fluorinated pyridine, and recovering a fluorinated product of said solute. No. 2,447,717. Joseph H. Simons (to Minnesota Mining & Mfg. Co.).

Production of paraffin hydrocarbon peroxides by contacitng a normally non-gaseous paraffin hydrocarbon in the liquid phase with a gas containing free oxygen in the presence of an amount of from 0.5 to 5.0% by weight of a basically reacting compound of an alkaline earth metal. No. 2,447,794. Philip D. Brewer (to Union Oil Co. of California).

Process for making nitroalkylcyclic amines. No. 2,447,821. Murray Senkus (to Commercial Solvents Corp.).

Preparation of 5-nitrotetrahydro-1,3-oxazines which comprises bringing a primary amine into reaction with a nitroparaffin having a nitro group attached to a primary carbon atom, in the presence of formaldehyde. No. 2,447,822. Murray Senkus (to Commercial Solvents Corp.).

Producing secondary amines by reacting a monofurfurylamine with a ketone and hydrogen in the presence of a metal chromite hydrogenation catalyst. No. 2,447,823. Everet F. Smith (to Commercial Solvents Corp.).

As a new product, a light-transmitting, solid film comprising terephthalic acid, the molecules of which are oriented. No. 2,447,831. Robert B. Woodward (to Polaroid Corp.).

Manufacture of nitrosulphones by mixing in the presence of a strong basic substance a nitroparaffin of the formula $RR'CHNO_2$ wherein R and R' are respectively selected from the group consisting of hydrogen and alkyl radicals, and a sulphone of the formula $R^2SO_2R^3$ wherein R^2 is selected from the group consisting of alkyl radicals, alkylene radicals, and alkyl halide radicals, and wherein R^3 is selected from the group consisting of alkylene radicals having an ethylenic double bond in a position α-β to the sulphone group, alkyl bromide radicals having the bromine radical in a position β to the sulphone group, and alkyl chlorides having the chlorine atom in a position β to the sulphone group. No. 2,447,974. G. D. Buckley (to Imperial Chemical Industries, Ltd.).

Preparing acetaldehyde acetal bodies which comprises reacting in the presence of mercury oxide and a boron trifluoride catalyst a vinyl ester of the formula $RCOOCH = CH_2$, wherein R is an alkyl group of one to three carbon atoms, and a glycol having more than three atoms. No. 2,447,975. Williard J. Croxall and Harry T. Neher (to Röhm & Haas Co.).

Preparation of substituted acylanilides. No. 2,447,998. Richard C. Clapp and John Krapcho (to American Cyanamid Co.).

Preparation of **β-aminopropionitrile** by introducing acrylonitrile into aqueous ammonia. No. 2,448,013. Saul R. Buc and Jared H. Ford (to The Upjohn Co.).

Preparing an ion exchange agent by reacting phenol sulphonic acid with formaldehyde in the presence of water. No. 2,448,029. George Beal Heusted and William C. Bauman (to Dow Chemical Co.).

Preparing unsaturated alcohols by treating a material selected from the group consisting of citral, lemon-grass oil, cinnamic aldehyde and a p-isopropyl-alpha-methyl-cinnamic aldehyde with hydrogen in the presence of a supported reduced cobalt catalyst. No. 2,448,047. William Jennings Peppel (to Burton T. Bush, Inc.).

Production of carbon by carbonization of the non-volatile fermentation products from saccharine materials. No. 2,448,051. Gustave T. Reich.

Dehydrofluorination process. No. 2,448,092. James D. Gibson (to Phillips Petroleum Co.).

Preparing vinyl chloride by reacting acetylene and hydrogen chloride in the presence of a mercuric chloride and thorium chloride on a porous carrier. No. 2,448,110. Hoke S. Miller (to Air Reduction Co., Inc.).

Amide derivative obtained by condensing an amide containing at least 12 carbon atoms and at least one hydrogen atom united to an amide nitrogen atom with formaldehyde and a member selected from the group consisting of salts of ammonia and salts of primary amines. No. 2,448,125. Richard Sallmann and Charles Graenacher (to Ciba Ltd.).

1,3-bis(o-xenyl)-triazene. No. 2,448,155. Henry H. Richmond (to U. S. Rubber Co.).

Reacting tertiary butyl chloride and bicyclo-(2,2,1)-heptane in the presence of aluminum chloride to effect conversion of said bicyclo-(2,2,1)-heptane into 2-chloro-bicyclo-(2,2,1)-heptane. No. 3,448,156. Louis Schmerling (to Universal Oil Products Co.).

Producing alkylated aromatics by reacting an aromatic with an olefin in the presence of an alkylating catalyst comprising silica, alumina and thoria. No. 2,448,160. Charles L. Thomas and Vladimir Haensel (to Universal Oil Products Co.).

Synthesizing the homologues of thiophene which includes contacting thiophene having at least one nuclear hydrogen replaced by an alkyl group with an olefinic hydrocarbon in the presence of catalytic material selected from the group consisting of activated natural clays and synthetic adsorbent composites of silica and at least one amphoteric metal oxide. No. 2,448,211. Philip D. Caesar and Alexander N. Sachanen (to Socony-Vacuum Oil Co., Inc.).

Vinyl alloxy acetate. No. 2,448,246. Robert S. Barker and Lynwood N. Whitehill (to Shell Development Co.).

Trademarks of the Month

A Checklist of Chemical and Chemical Specialties Trademarks

STA-DRI. Granulated material premixed with an adhesive compound that is sprayed on the hulls of ships that is, the product serves as a condensation and moisture eliminator, to prevent sweating of the hulls. 440,374. Donnelly-Trent Co.

EUREKA. Lubricating grease. 461,684. Eureka Vacuum Cleaner Corp.

CENOLCO. Lubricating oils and greases. 485,751. Central Petroleum Co.

SELIG ATLANTA. Sanitary floor oil. 488,619. Selig Co.

COLOFORM. Paint remover. 492,347. Oscar Mahler d/b/a The Techema Co.

CLEAN SWEEP. Chemical compound used as a fire scale and soot eradicator. 497,845. Clean Sweep Co.

OILFOS. Inorganic phosphates for general use in the petroleum industry. 497,954. Monsanto Chemical Co.

THE AMERICAN VARNISH CO. EST. 1883. Varnishes; ready-mixed, dry, and paste paints; oil and varnish stains; lacquers; paint enamels; polishing wax; furniture polish; sizings, primers, sealers, undercoating and fillers in the nature of paints or for use in connection with paints, varnishes, etc.: and colors in oil. 499,461. American Varnish Co.

Kyanize CLINGCOTE. Ready-mixed paint and paint enamel. 501,543. Boston Varnish Co.

SEAL-A-LEAK. Liquid coating material in the nature of a paint. 502,219. Missouri Paint & Varnish Co.

KLEEN KEY. Type cleaner. 502,223. U.S. Typewriter Ribbon Mfg. Co.

WEED-NO-MORE. Chemicals for exterminating weeds. 504,217. Sherwin-Williams Co.

MEL-FLOR. Sheet material compounded of rubber for great resistance to wear and abrasion as a floor covering. 504,722. L. E. Warford d/b/a Melflex Products Co.

SCA. Sulfite and sulfate paper pulp, rayon pulp, ground wood, and tall oil and dissolving pulps. 505,531. Svenska Cellulosa Aktiebolaget.

ALCAN. Aluminum sulfate. 507,702. Aluminum Co. of Canada, Ltd.

UNXLD 448. Insect repellent compositions. 508,256. Unexcelled Chemical Corp.

KLINCH. Grain cement—namely a sodium silicate cement for cementing grains of abrasive material. 509,025. George C. Nixon d/b/a The Steel Treating Equipment Co.

ABRIL. Liquid, semi-liquid, or solid non-drying adhesives, being chemical products consisting of nitrogen derivatives of organic compounds for the non-permanent bonding of substances and materials. 510,224. Abril Corp., Ltd.

REVEILLE RED. Organic pigments used for coloring paints. 510,403. Reichhold Chemicals, Inc.

Bright Sail. Liquid floor wax and wax paste. 511,017. Great Atlantic & Pacific Tea Co.

REDI-LITH. Printing ink. 511,969. Sun Chemical Corp.

RESOFORM. Dyestuffs for coloring plastics. 512,328. General Dyestuff Corp.

INSOL. Insect repellent and preparation to be applied to skin to secure an even sun tan. 512,640. Chemical Research Products, Inc.

EKTACHROME. Photographic processing kits. 513,035. Eastman Kodak Co.

PHENOXETOL. Chemical compounds, being benzene derivatives of the glycols, for use as preservatives in pharmaceutical and medical preparations. 513,269. Nipa Laboratories Ltd.

DYNA-FLEX. Protective resinous coating composition in the nature of paint for use as a stripable coating. 513,437. Merchants Chemical Co.

ZAFLO. Lacquers; varnishes; paint enamels; compositions containing cellulose esters and/or ethers, resins and/or plasticizers, solvents, and pigments for controlling luster and color, in the nature of a paint for lacquering and enameling; and thinners therefor. 514,930. Atlas Powder Co.

RUBBERTEX. Rapid drying rubberized wall finish—namely, a synthetic phenolic ready mixed liquid paint for interior cement, plastic, or brick surfaces, and paint enamel. 514,974. Master Mechanics Co.

Gaco. Liquid lining preparations composed primarily of chemicals, plastics, resin, and rubber. 515,169. Gates Engineering Co.

Hampden. Ready-mixed paints, colors in oil, paints for masonry, soil-resistant paint, heat and chemical resistant enamels in the form of paint, paste and liquid fillers for wood, interior flat finish, graphite paint for metal surfaces, boiler covering paint, paint for the exposed surfaces of structural iron and steel, iron-ore paint, mill white paint, dry colors and pulp colors. 515,835. Hampden Color & Chemical Co.

Kleer-Flo. Liquid solvents for carbon, paint, aniline dyes, varnish, gummy residues, for use in the cleaning of automobile parts. 516,375. Practical Products Co.

BARRAPLEX. Plastic coated textile fabrics, in the piece consisting of wool, silk, cotton, rayon, nylon, and protein fibers. 517,399. Barret Textile Corp.

SLUDGOUT. Composition for treatment of fuel oils to prevent and eliminate sludge. 517,918. Metropolitan Refining Co., Inc.

ANTHOMINE. Assistants useful in dyeing procedures. 517,954. Arkansas Co., Inc.

DIVO. Cleaner in powder form for use in cleaning dairy utensils and machinery. 518,285. Diversey Corp.

SCRIPTITE. Synthetic resins for use as pigment binding agents in the preparation of coating compositions. 518,552. Monsanto Chemical Co.

LINO-TECT. Linoleum cement. 519,806. Benjamin Foster Co.

KOROSEAL. Floor covering in the form of flexible sheets, strips and tile made of plastic resilient vinyl resin material. 519,941. B. F. Goodrich Co.

RESLOOMED. Textile fabrics composed of cotton, wool, linen, or synthetic fibers and mixtures thereof, which fabrics are resin impregnated for resistance to wear, shrinkage, crushing, and the like. 520,051. Monsanto Chemical Co.

RESLOOM. Textile fabrics composed of cotton, wool, linen or synthetic fibers and mixtures thereof, which fabrics are resin impregnated for resistance to wear, shrinkage, crushing and the like. 520,052. Monsanto Chemical Co.

RED SPOT SUDSIQUICK. Synthetic type of soap and grease remover. 520,650. Red Spot Paint & Varnish Co., Inc.

MILLERS RELIEF. Chlorinated hydrocarbon fumigant used for "spot fumigation" of mill machinery, warehouses, etc. 520,705. Huntington Laboratories, Inc.

SEMINEX. Carbon black. 520,814. Jefferson Lake Sulphur Co., Inc.

PYROTWEED. Plastic-coated cotton fabrics. 521,235. Asher & Boretz, Inc.

CRYSTO-CLEER. Window curtains, window draperies, crib sheets, table top covers, and table cloth covers, all formed of plastic film. 521,239. Boland Mfg. Co.

SPEC-TAK. Metal polish in liquid form. 521,248. Diversey Corp.

UNDERSEAL. Rust, corrosion, and abrasive resistant rubberized coating material, in sprayable form, for protectively coating exposed surfaces of automobiles. 521,356, Minnesota Mining & Mfg. Co.

MASONEX. Binders in liquid form for binding finely divided material. 521,742. Masonite Corp.

MASONOID. Binders in powder or other

dry form for binding finely divided material. 521,743. Masonite Corp.

Rub-R-Kleen. Cleanser in powdered form having incidental water-softening properties, for cleaning and soaking milking machine tubes. 522,734. Diversey Corp.

DI-CHLOR-MULSION. Insecticide. 523,445. Woolfolk Chemical Works, Ltd.

TRISCONIZE. Chemicals for control of chlorination. 524,487. Scholler Brothers, Inc.

SPENSOL. Nitrogen solution—namely, a solution of ammonium nitrate in ammonium liquor for use in the manufacture of fertilizer. 526,501. Spencer Chemical Co.

COW. Sal soda and baking soda. 526,742. Church & Dwight Co., Inc.

COW BRAND. Sal soda, monohydrated carbonate of soda, and baking soda. 526,779. Church & Dwight Co., Inc.

DWIGHT'S. Sal soda and bicarbonate of soda. 526,792. Church & Dwight Co., Inc.

WOCOLUBE. Lubricating grease. 526,833. Pure Oil Co.

MALLOPHENE. The product phenyl-azo-alpha-alpha-diamino-pyridine hydrochloride and base for antiseptic, healing, and various other therapeutic purposes. 526,934. Mallinckrodt Chemical Works.

ICHTHYMALL. Ammonium ichthosulfonate used for the treatment of skin diseases. 526,935. Mallinckrodt Chemical Works.

SINCLAIR. Caustic soda in dry and granular state for use as a drain opener. 527,006. H. M. Sinclair, Jr. for Sinclair Mfg. Co.

PUROLENE. Lubricating oils and greases. 527,282. Pure Oil Co.

Kirko. Sudsing cleaner, cleanser and detergent. 527,681. Proctor & Gamble Co.

THERMO FINE. Fine grain film developer in powder form. 527,949. Edwal Laboratories, Inc.

lastic life. Coating composition for protecting tennis, badminton, and squash racket strings. 527,969. Armour & Co.

.PEACOCK SILVER POLISH. Silver polish. 528,736. C. D. Peacock, Inc.

BORNO. Wax-like emulsions for lubricating molds, textile threads, and the like. 528,904. Perkins Soap Co.

PIXOL. Dyeing assistants including dispersants, penetrants, and anti-bronzing agents. 529,220. American Aniline Products, Inc.

INTERNATIONAL PRODUCTS CORPORATION. Tanning extracts. 530,513. International Products Corp.

LUNA. Tanning extracts. 530,514. International Products Corp.

KAL-O-KOTE. Flat wall paint. 530,714. Boatwright Paint & Varnish Works.

ZIN-TI-LED. Paste outside paint. 530,715. Boatwright Paint & Varnish Works.

SCOTCH SOAP. Soaps. 530,746. Los Angeles Soap Co.

SAVON CASTILE. Soap. 530,744. Los Angeles Soap Co.

GOLD TAG. Soap and soap compounds. 531,462. Gold Par Products Co., Inc.

LUMABRITE. Preparation for cleaning and polishing aluminum. 531,853. Selig Co.

ALL-KYL. Sensitizing agents with germicidal properties. 532,472. Mathieson Alkali Works.

K & M. Paint oil, used both as a vehicle for paint pigments and also in thinning paste paints. 532,603. Kelloggs & Miller Sales Corp.

SOUR-TEC. Acidic compound for souring or neutralizing alkalinity in laundry operations. 533,095. Wyandotte Chemicals Corp.

PLURACOL. Polyoxyalkylene glycols of relatively higher molecular weights particularly useful as emulsifying, thickening, dispersing, binding, lubricating, and plasticizing agents. 533,096. Wyandotte Chemicals Corp.

KLERA-CID. Acidic compound for souring or neutralizing alkalinity. 533,100. Wyandotte Chemicals Corp.

FLAKE K.B.X. An alkaline composition for use in the food, beverage, laundry and textile industries, and particularly adapted for imparting alkalinity to bottling washing solutions, laundry solutions, and for kier boiling. 533,103. Wyandotte Chemicals Corp.

HOUPOID. Lubricating oils and lubricating greases. 533,567. E. F. Houghton & Co.

MAR TEMP. Mixture of inorganic salts having a low melting point and suitable for use as a molten tempering media for steels. 533,572. E. F. Houghton & Co.

CARBO-DUR. Activated carbon for general use in the industrial arts. 534,048. Permutit Co.

FLEECE WHITE. Paste paint and paint enamel. 534,272. Great Lakes Varnish Works, Inc.

WHITEPLUS. Paint enamel. 534,273. Great Lakes Varnish Works, Inc.

V.E.P. Lubricating oils and greases. 534,460. Ohio Oil Co.

AROMEX. Carbon black having a variety of industrial uses. 534,629. J. M. Huber Corp.

STURACO. Extreme pressure lubricating oils and greases. 534,687. D. A. Stuart Oil Co., Ltd.

Glim-x. Non-ionic chemical liquid detergents. 534,764. General Aniline & Film Corp.

GAYOSO. Exterior and interior house paints, flat wall paints, semi-gloss wall paints, paint enamels, floor paints, varnishes, lacquers, oil and varnish stains, liquid and paste wood fillers, roof paints, barn paints, paint and varnish thinners, tinting colors in oil, shellacs, interior cold water paints, varnish stains, stack and boiler paints, asphalt paints, calcimines. 534,948. True-Tagg Paint Co.

TRULINE. Interior and exterior paint enamels. 534,955. True-Tagg Paint Co.

ZINODINE. Solid or liquid chemical admixtures used for the production of chemical coatings for the prevention of oxidation to zinc and cadmium surfaces and to prepare such surfaces for the application of paint on other finish. 535,115. American Chemical Paint Co.

WATERGLIDE. Lubricating oils and greases. 535,608. Pate Oil Co.

Q. Water softener for use in metal and textile industry; esters of oily or waxy nature; synthetic waxes for treating textiles and other fibrous materials; synthetic resins for treating textiles and other fibrous materials; emulsions of resins in aqueous and non-aqueous media for coating, finishing, filling textiles, fabrics and yarns; oleaginous preparations for use as wool and textile lubricant; organic wetting agents; organic plasticizer agents. 535,871. Quaker Chemical Products Corp.

Plastile. Plastic floor, wall, counter, or furniture covering. 536,020. U. S. Stoneware Co.

"GLASSENE." Household detergent. 536,082. Hans Jacob Heckmann.

Durmolized. Paints in paste or semi-paste form, and varnish. 536,146. Seidlitz Paint & Varnish Co.

TURBEN. Liquid substitute for turpentine. 536,159. Seidlitz Paint & Varnish Co.

FAIRCREST. Soap. 536,366. The Fair.

BENZAHEX. Agricultural insecticides and fungicides. 536,767. Chipman Chemical Co., Inc.

TO-NA-CIDE. Insecticides and compositions effective as insect and/or animal repellents. 537,702. Roman J. Irwin, Inc.

AMAVAR. Synthetic varnishes. 537,768. American Alkyd Industries.

Bright Sail. Liquid floor wax and wax paste. 538,126. Great Atlantic & Pacific Tea Co.

Bright Sail. Soap powder, soap grains, soap flakes, hand soap and household cleanser. 538,127. Great Atlantic & Pacific Tea Co.

Emblem. Solid carbon dioxide, anhydrous ammonia, nitrogen solution comprising a solution of ammonium nitrate in ammonia liquor and aqua ammonia. 538,191. Spencer Chemical Co.

KEY-LUX. Paint enamels. 538,292. Keystone Varnish Co.

TOM THUMB. Ready-mixed paints, wood stains, and paint enamels sold in liquid form. 538,371. Chicago Paints, Inc.

PURAD. Chemical compounds and substances for addition to mineral oil lubricants to improve the lubricating properties. 538,812. Pure Oil Co.

TIMBOND. Blood resin adhesive compositions. 538,848. Armour & Co.

NANTUCKET WHITE. White paint in liquid form for exterior use. 539,068. M. J. Merkin Paint Co., Inc.

HOUSTON'S DERRIS MIXTURE. Insecticides. 539,170. Sam Houston Co.

HSPA ACTIVATOR. Herbicides. 539,195. Monsanto Chemical Co.

RESILOID. Plastic film. 539,350. Resiloid Corp.

TREEZE. Animal cleaners—namely, dog shampoo. 539,456. William M. Stieh & Co., Inc.

STOPALL. Waterproofing material comprising a liquid mixture of organic materials for brushing or spraying on masonry. 539,457. Stopall Waterproofing Manufacturers, Inc.

DULVAR. Varnish. 539,602. Minnesota Linseed Oil Paint Co.

VYLENE. Plastic film. 539,988. Resiloid Corp.

TRA-LEZE. Compounded petroleum wax. 540,441. National Wax Co.

KALQ. Insecticides. 540,760. Agkem, Inc.

W-N-M WEED-NO-MORE. Chemicals for exterminating weeds. 540,908. Sherwin-Williams Co.

BRAS-BRITE. Brass polish, liquid paste, or semi-paste. 540,912. Sherwin-Williams Co.

TAG. Soap. 540,948. M. Werk Co.

RE-NU. Soap. 540,965. Armour & Co.

SAPONOL. Wetting and emulsifying agent for use as a soil and spot remover in dry cleaning. 541,153. Joseph A. Marchetta d/b/a Central Laboratories.

DAY'S LIQUID Pine Cleanser. Liquid detergent cleaner. 541,177. Morton S. Pine Co.

MIDLAND VAT BLUE R. Vat dyes. 541,268. Dow Chemical Co.

Mor-les-nitrate. Soil testing chemicals for determinating nitrate-nitrogen content of soils. 541,612. Urbana Laboratories.

Sep-ko WETTING COMPOUND. Wetting agent to be added to water for use in removing scum, milk stone, water scale, calcium, magnesium and other hard elements in the water from dairy processing equipment. 541,869. Monarch Soap & Chemical Co.

POLYCIZER. Plasticiers for synthetic plastics and more particularly for use in vinyl resins and synthetic rubbers of the nitrile type. 542,124. Harwick Standard Chemical Co.

BIS. Toilet soaps. 542,602. Les Parfums de Dana, Inc.

GIVAUDAN DELAWANNA, INC. Organic odoriferous and flavor imparting chemicals; organic chemicals used in perfumes, cosmetics, paints, varnishes, drying inks, bactericidal, fungicidal, insecticidal and preservative compositions; organic chemicals used as rancidity stabilizers in soaps; perfumes; essential oils. 543,038. Givaudan-Delawanna, Inc.

ultra wash. All-purpose cleaning compound. 543,053. Atlantic Refining Co.

CMC. Carboxymethyl cellulose for use as an ingredient of adhesives, thickening agents, emulsion stabilizers, detergents, textile sizes and finishes. 543,181. Hercules Powder Co.

BRITEE MAGIC. Cleaning compound for automobiles, upholstery, rugs, woodwork, furniture and venetian blinds. 543,410. B. & B. Products Co.

ACETEX. Laundry sour. 543,450. Hood Chemical Co., Inc.

CRESTEX. Alkali neutralizer in the nature of a laundry sour. 543,451. Hood Chemical Co., Inc.

BOXER. Liquid and powdered cleaning compounds for general use with water. 543,728. O. W. Meeker d/b/a Industrial Chemical Cleaner Co.

HARMONY HOUSE. Linoleum paste. 544,912. Sears, Roebuck & Co.

VITALIFE. Chemical composition in granular or tablet form adapted for internal introduction into plants and trees for use in the treatment of diseases. 545,004. Samuel W. Kendall d/b/a Vitalife Co.

S'COR. Pure cocoanut oil toilet soap, pine oil liquid cleaning compound having disinfecting and deodorizing properties. 545,393. Sanitation Corp.

PRESTO. Printing inks and printing ink varnishes. 545,538. Charles E. Salmon, Inc.

IMPREGNO. Insecticide concentrate. 546,726. S. B. Penick & Co.

PYREXCEL 20. Insecticide concentrate as a constituent in the manufacture of insecticides. 546,727. S. B. Penick & Co.

GRIFFIN A.B.C. Shoe polishes, shoe blackings, shoe cleansers, leather dressings, and leather preservatives. 546,847. Griffin Mfg. Co., Inc.

ALROTERGE. Surface active agent for use as a detergent, penetrant, dispersant, and emulsifier, more particularly for treating fabrics and metals. 546,936. Alrose Chemical Co., Inc.

DERMATERGENT. Synthetic detergent. 546,956. Colgate-Palmolive-Peet Co.

GRIFFIN. Shoe polishes, shoe blackings, shoe cleansers, leather dressings, leather preservatives, and cleaning fluid for fabrics and leather. 547,333. Griffin Manufacturing Co., Inc.

STERLING. Liquid and paste for cleaning, dressing, and polishing shoes. 547,340. Griffin Manufacturing Co., Inc.

DYCOTE. Liquid preparation for polishing leather shoes. 547,627. Griffin Manufacturing Co.

INSTO. Insecticides. 549,045. Bacon Products Co.

Bathasweet. Water softener, talcum powder, cologne, and bath oil. 549,046. Bathasweet Corp.

MOTH-PANIC. Moth proofing fluid. 549,142. Feller-Jones Corp.

King-O-Cide. Herbicides. 549,151. J. M. F. Chemical Co.

AMERIZE. Oil for waterproofing leather. 549,405. American Finish & Chemical Co.

SOAPTERGENT. Soap. 550,591. Essential Chemicals Co.

DYPERKEM. Diaper odor counteractant. 550,641. Airkem, Inc.

UNCLE NICK'S. Detergent, and a wetting agent, to be dissolved in water to provide a solution for use in washing or cleaning automobile bodies and the like, metal objects, textiles, leather, wool, and the like. 552,161. Oil-Dri Corp. of America.

VOO DOO White Magic. Insecticide. 552,303. Xterminator Products Corp.

dial. Bath and toilet soap. 552,739. Armour & Co.

Spirittine. Liquid soap, pine cleanser, and sweeping compound. 552,890. Spirittine Chemical Co.

MARKEM. Cleaning compound for cleaning ink from metal reservoirs. 554,138. Markem Machine Co.

TRIONA. Insecticides used as garden and orchard sprays. 554,331. Shell Oil Co., Inc.

Nicona. Insecticides used as garden and orchard sprays. 554,332. Shell Oil Co., Inc.

SANTOPHOBE. Synthetic resins in solution form for use in treating textiles to improve their appearance and feel. 554,582. Monsanto Chemical Co.

ANTAROX. Liquid or finely-divided solid organic chemical detergent having surface active, wetting, and emulsifying properties. 557,035. General Aniline & Film Corp.

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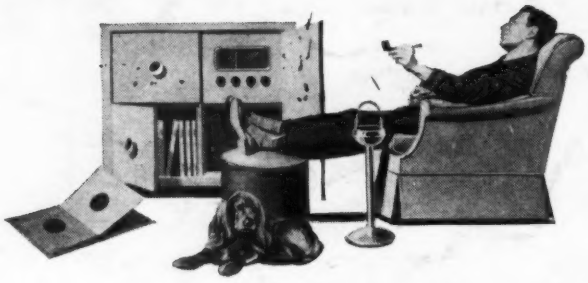

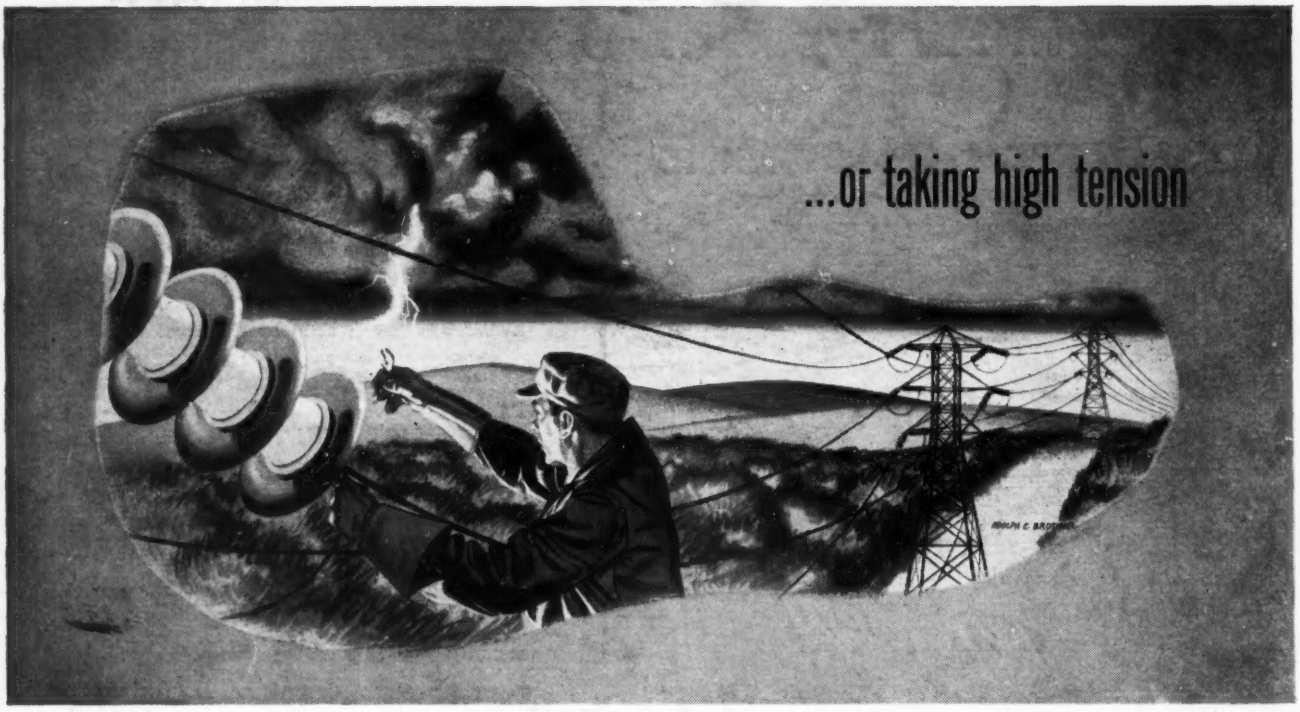

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